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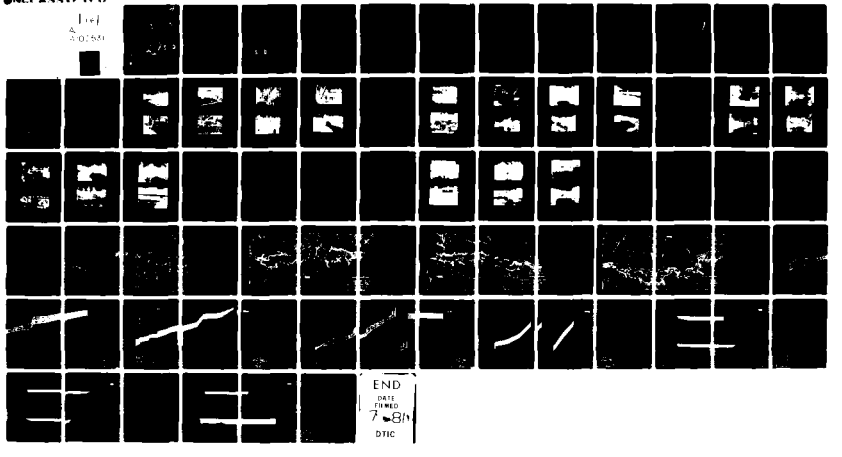
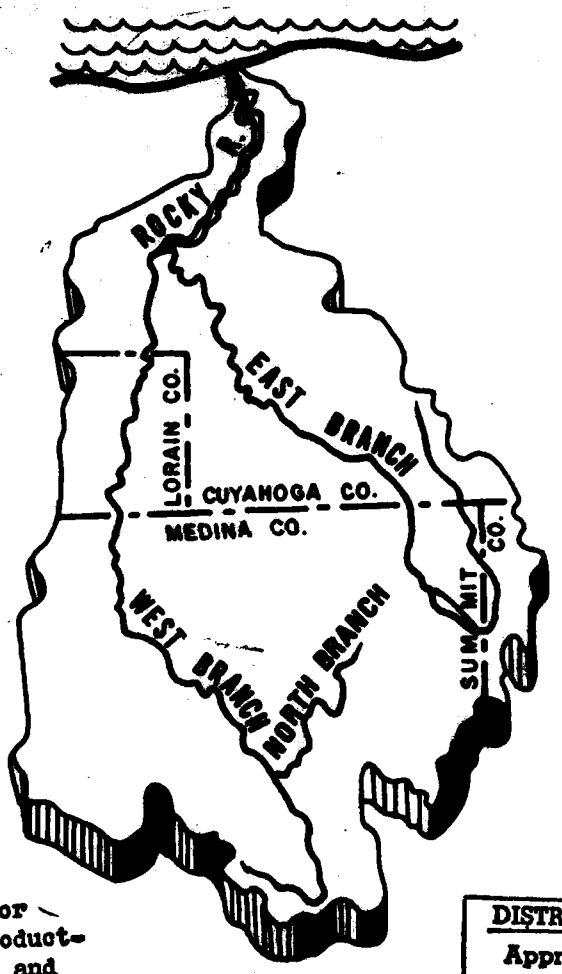


FLOOD PLAIN INFORMATION
EAST BRANCH ROCKY RIVER
CITY OF NORTH ROYALTON & HINCKLEY TOWNSHIP

CUYAHOGA AND MEDINA COUNTIES OHIO



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PREPARED FOR
OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF PLANNING, FLOOD PLAIN MANAGEMENT SECTION
REGIONAL PLANNING COMMISSION, CUYAHOGA COUNTY
TRI-COUNTY REGIONAL PLANNING COMMISSION

BY

CORPS OF ENGINEERS, U.S. ARMY
BUFFALO DISTRICT

JUNE 1974

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The purpose of this study is to correct and develop information on past and probable future floods which may be useful to local authorities in future study, planning and action designed to eliminate or reduce flood hazards and to avoid future damages likely to be associated with the development in flood prone areas. This report is based on hydrological facts historical, and recent flood heights, and technical data having a bearing on the occurrence and magnitude of floods within the study area. This report covers approximately 14 miles of stream and flood plain area along East

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Branch Rocky River from 130th Street bridge at the North Roayalton corporate limits to the Medina-Summit County line. Within the study reach the stream flows through the southwest portion of the City of North Royalton and through the central and southwest portions of Hinckley Township.

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INTRODUCTION

Flood plains exist primarily to temporarily convey and store flood flows which periodically exceed the capacity of the natural or man-made watercourses therein. They have also been an inviting although not always a profitable or wise attraction for development by man. Advantages of waterborne transportation and commerce led to early settlement along the river networks and the strong aesthetic attraction water holds for man has further encouraged encroachment into flood prone areas.

Where such development has occurred, floods threaten life, health, property and disrupt business among its other impacts on man's environment. An obvious solution to this problem is to exercise greater wisdom in the use of flood plains. However, such wisdom cannot be exercised unless there is adequate knowledge of the flood hazard potential and a will on the part of the users of flood plains to plan with the hazard in mind. Regulatory powers to affect sound land use in flood prone areas have not been used extensively until recent years. Because flood plains are attractive development sites, flood plain management practices cannot of themselves eliminate flood damages but can certainly reduce them, and should be given greater consideration by both planners and local governments. Consequently, the Flood Plain Management Services Program was developed within the Corps of Engineers to provide local governments with a better understanding of their flood problems and their effect on future growth and development. The program provides flood hazard information that may be used to develop land use regulations for guiding community growth.

This flood plain information report is for East Branch Rocky River, beginning at the West 130th Street bridge crossing at the corporate limits of North Royalton in Cuyahoga County and extending upstream to the Medina-Summit County line. It has been prepared at the request of the Ohio Department of Natural Resources, Division of Planning, Flood Plain Management Section, and the Cuyahoga County Regional Planning Commission and Tri-County Regional Planning Commission. Distribution of the report to local interests will be through these agencies.

The purpose of this study is to collect and develop information on past and probable future floods which may be useful to local authorities in further study, planning and action designed to eliminate or reduce flood hazards and to avoid future damages likely to be associated with the development in flood plain areas. With this report information, future development in flood prone areas can be planned at elevations high enough to avoid flood damages or at least with full recognition of the chance of hazards of flooding that exist.

This report is based on hydrological facts, historical and recent flood heights, and technical data having a bearing on the occurrence and magnitude of floods within the study area.

Included in this report are maps, profiles, photographs, and cross sections which indicate the extent of flooding that might occur in the future. If properly used, this information can be beneficial in wise flood plain management. The maps, profiles and cross sections indicate the depth of probable flooding at any location which would result from the occurrence of either the Intermediate Regional Flood or the Standard Project Flood.

The report does not include plans for solutions of flood problems but provides the basis for further study and planning on the part of local governments to arrive at solutions which will minimize future flood damages. This can be accomplished by local planning programs which guide essential development by controlling the type of land use in the flood plain through zoning, building codes, health regulations and other regulatory methods. Pamphlets and guides pertaining to flood plain regulations, flood proofing, and other related actions have been prepared by the Corps of Engineers. They are available to State agencies, local governments and citizens for planning and acting to reduce flood damage potential.

The Buffalo District of the Corps of Engineers will, upon request, provide technical assistance to Federal, State and local agencies in the interpretation and use of the information contained within this report and will provide other available related flood data. Requests for technical assistance should be coordinated through the Ohio Department of Natural Resources, Division of Planning, Flood Plain Management Section, Fountain Square, Columbus, Ohio 43224.

SUMMARY OF FLOOD SITUATION

This report covers approximately 14 miles of stream and flood plain area along East Branch Rocky River from the West 130th Street bridge at the North Royalton corporate limits to the Medina-Summit County line. Within the study reach the stream flows through the southwest portion of the City of North Royalton and through the central and southeast portions of Hinckley Township. The location of East Branch Rocky River and the length included in this study are shown on Plate 1.

Past Flood Occurrences - There are no stream gaging stations or official records of past floods on this reach of East Branch Rocky River. A search of newspaper files and interviews with local officials in the area disclosed only one high water mark.

From studies of possible future floods, the flood situation along the study reach has been developed and is summarized in the following paragraphs.

Intermediate Regional Flood - The Intermediate Regional Flood is a flood that has an average frequency of occurrence in the order of once in 100 years. It is the minimum flood recommended by the Ohio Department of Natural Resources to define the regulatory flood plain.

Standard Project Flood - The Standard Project Flood is a flood produced by the most severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the drainage basin under study. The elevation obtained from a flood of this magnitude is considered by the Corps of Engineers to be the upper limit of the flood plain.

Flood Damages - Within the study reach relatively little development has taken place. This is of course the proper time to identify flood prone areas and establish local regulations to prevent unwise use and development from encroaching into the flood plain, thereby increasing the flood damage potential. It is the purpose of this report to provide local officials with the needed flood elevations and flood area maps so that they can proceed with adopting flood plain regulations. An occurrence of the Intermediate Regional Flood or Standard Project Flood in the study reach would cause damage to any development within the flooded area because of the depth of flooding and accompanying higher velocities.

Main Flood Season - Normally major floods occur during the winter and spring months as a result of melting snow accompanied by moderate amounts of rainfall. However, it is possible for flooding to occur in any month of the year. Summer and fall floods usually result from intense local thunderstorms.

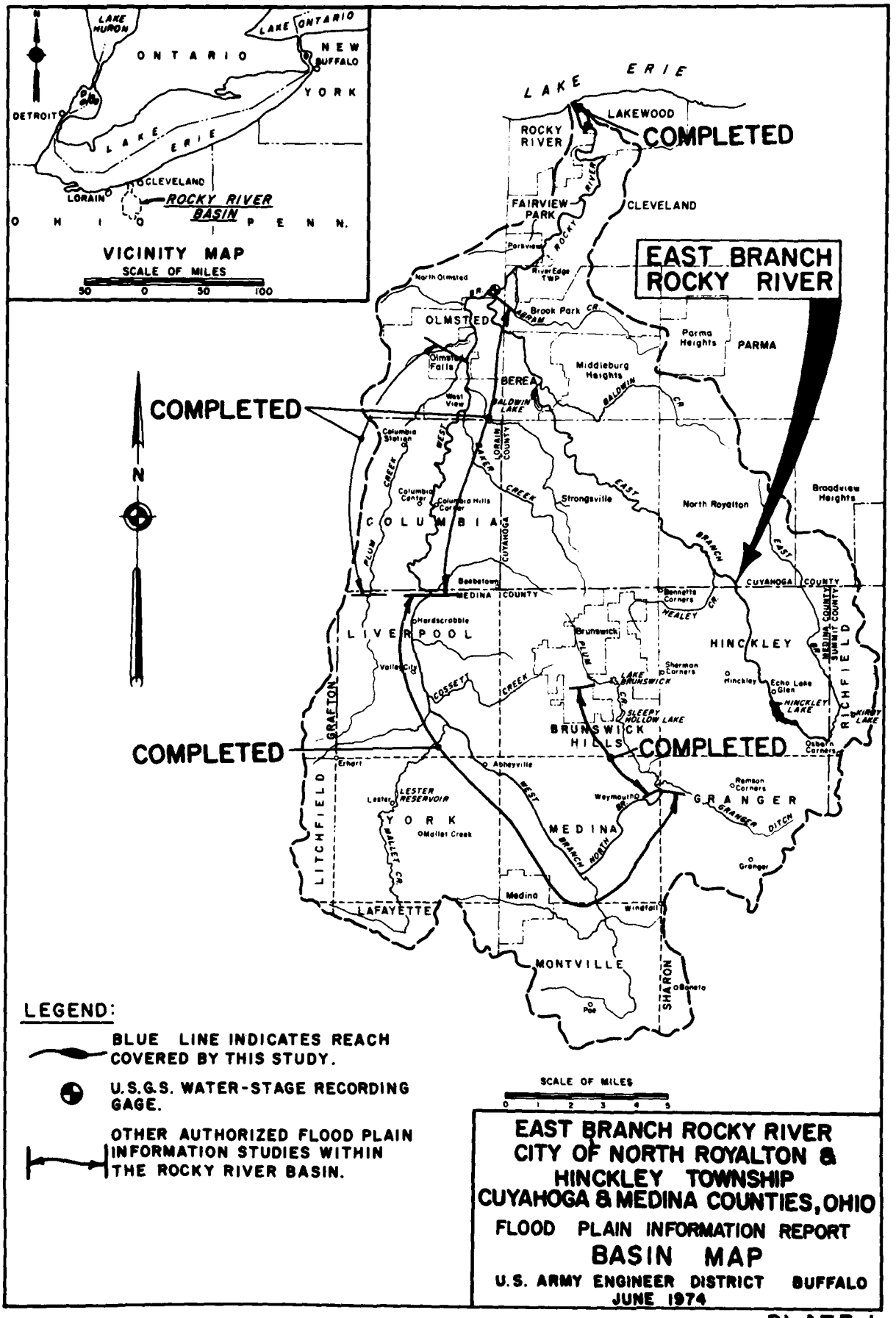
Flood Damage Prevention Measures - There are no existing or authorized flood

control projects within the study area. Hinckley Lake, although not a flood control reservoir, does influence streamflow downstream and flood heights upstream.

Possible Flood Heights - Flood levels that would be reached by the Intermediate Regional and Standard Project Floods are shown on Table 2 in the text. The table gives a comparison of these flood levels with bridge floor, average underclearance and stream bed elevations at the nine bridge crossings. The water surface profiles for the Intermediate Regional Flood and the Standard Project Flood are shown on Plates 6, 7, 8 and 9 and the flooded area on Plates 3, 4 and 5.

Velocities of Water - During an Intermediate Regional or Standard Project Flood, average channel velocities would vary from about one to 15 feet per second. Velocities greater than three feet per second combined with depths of three feet or greater are generally considered hazardous and dangerous to life and property.

Hazardous Conditions - Larger floods can cause hazards to local residents in many ways. Since most floods occur in the late winter and/or early spring, residents caught within the flood may suffer discomfort from lack of heat for a number of days due to basement flooding which extinguishes furnace fires. Due to the duration and extent of flooding, health problems can develop when septic tanks are inundated and high water backs up sewer lines into basements. Municipal sewage treatment plants are often taxed beyond their capacities. Untreated discharge to floodways is made with consequent deposition of waste materials on stream banks and surrounding grounds. Flood waters which overtop roads can cause hazardous driving conditions. The danger from underestimating the velocity and depth of flood waters by unsuspecting children is an age old problem confronting residents within the flooded area.



EAST BRANCH ROCKY RIVER
CITY OF NORTH ROYALTON & HINCKLEY TOWNSHIP
CUYAHOGA & MEDINA COUNTIES, OHIO
FLOOD PLAIN INFORMATION REPORT
BASIN MAP

U.S. ARMY ENGINEER DISTRICT BUFFALO
JUNE 1974

PLATE I

GENERAL CONDITIONS AND PAST FLOODS

Description of the Area

Physical Setting - East Branch Rocky River flows northwest from the Medina-Summit County line to Hinckley Lake and then north through the center of Hinckley Township. It then flows in a northwest direction through the southwest corner of North Royalton in Cuyahoga County to the downstream limit of the study area at the North Royalton-Strongsville corporate limit. The location of East Branch Rocky River within the Rocky River basin is shown on Plate 1.

Over its total length of 34.5 miles, East Branch Rocky River rises 571 feet from elevation 650 feet at its mouth, to elevation 1,221 feet at its source. This results in an average fall of 16.5 feet per mile. Within the 13.95 miles in this study area, East Branch Rocky River rises 144 feet from elevation 812 at the West 130th Street bridge to elevation 956 feet at the Medina-Summit County line. This results in an average fall of 10.3 feet per mile.

Rocky River drains a total of 293 square miles of which 76.9 square miles are tributary to the East Branch Rocky River. At the downstream limit of the study area the drainage area of East Branch Rocky River is 50.6 square miles and at the upstream limit the drainage area is 13.6 square miles. Data pertaining to drainage areas and river mile location for the major tributaries within the Rocky River basin are shown on Table 1.

Settlement - The first settlement in Royalton was made in 1811 by Melzer Clark in the southeast corner of the township. The second settlers arrived five years later and settled about a half mile south of the center of the township. The township was formally organized in 1818. Settlement at the Village of Royalton Center did not occur until about 1827. In 1927, the Village of North Royalton was incorporated, encompassing the entire township. Its growth was rapid due to city dwellers moving to the suburbs and has attained the status of a city. In 1970, North Royalton had a population of nearly 13,000.

In the distribution of the lands of the Western Reserve among the original land speculators, Judge Samuel Hinckley purchased the area now known as Hinckley Township. Hinckley was a rough area and no particular effort was made to sell the land. The valley of the Rocky River from its big bend on the Granger Township line northward, and the western side of the great Hinckley Ridge, was considered by the settlers as the hunter's paradise.

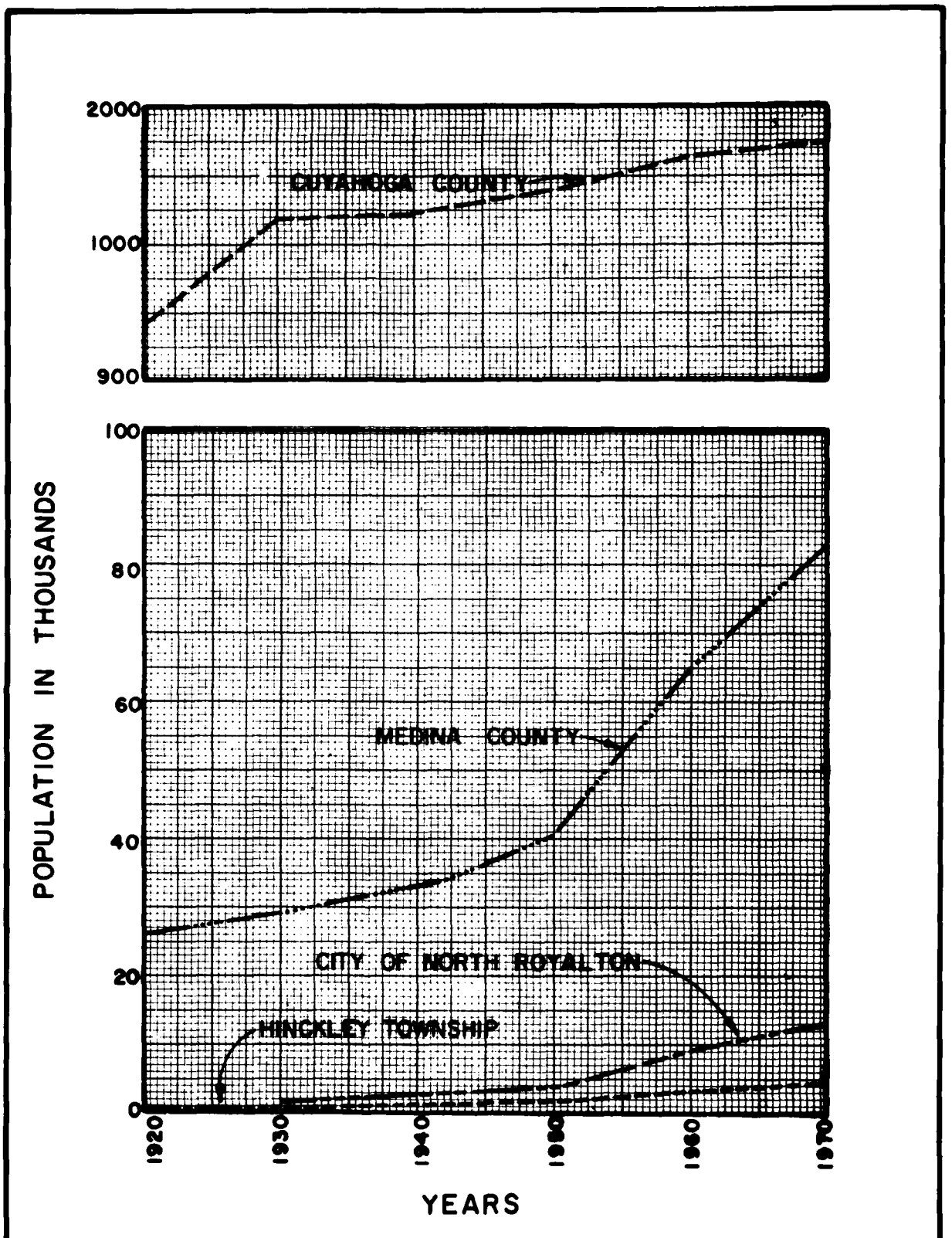
In 1818, farmers and settlers in Medina, Summit, and Cuyahoga Counties organized a hunt to kill off the wild animals in Hinckley. The following year, a survey was made and the first settlement was made in 1820. Five years later, Hinckley Township was formally organized.

Population - Population trends of the political subdivisions in the vicinity of East

Branch Rocky River are shown on Figure 1. Both North Royalton and Hinckley Township have shown an accelerated growth since 1950. Pressure to develop the flood plains will undoubtedly accompany continued growth.

Factors Affecting Floods and Flood Damages

Channel Conditions and Development - The study area begins at river mile 25.85 at the western corporate limits of North Royalton. Throughout its 5.29 mile length through North Royalton, the channel banks are lined with heavy brush and trees as it flows through the Rocky River Reservation. Typical channel conditions are illustrated in Figures 2 through 5. In some places, trees have fallen in the river causing an obstruction to flow as shown in Figure 6. Although very little development has taken place in this stretch of the river, a few houses have been constructed in the flood plain as shown in Figure 7.



POPULATION TRENDS

FIGURE 1

TABLE 1

DRAINAGE AREAS WITHIN THE ROCKY RIVER BASIN

Location	Distance Upstream from Mouth, Miles	Drainage Area, Square Miles
Rocky River at Lake Erie	0.0	293
Rocky River downstream of Abrams Creek	10.7	279
Abrams Creek	10.7	10.2
Rocky River upstream of Abrams Creek	10.7	268
Rocky River at gage	12.4	267
Rocky River below confluence of East and West Branch	12.45	267
East Branch at mouth	12.45	76.9
East Branch downstream of Baldwin Creek	17.7	74.2
Baldwin Creek at mouth	17.7	10.0
East Branch upstream of Baldwin Creek	17.7	64.1
West Branch at mouth	12.45	190
West Branch downstream of Plum Creek	15.6	179
Plum Creek at mouth	15.6	17.7
West Branch upstream of Plum Creek	15.6	161
West Branch downstream of Mallet Creek	32.5	105
Mallet Creek at mouth	32.5	18.1
West Branch upstream of Mallet Creek	32.5	87.4
West Branch downstream of North Branch	41.5	84.1
North Branch at mouth	41.5	61.1
North Branch downstream of confluence of Plum Creek and Granger Ditch		28.1
Plum Creek		12.9
Granger Ditch		15.2
West Branch upstream of North Branch	41.5	23.0

The remaining 8.66 miles flow through Hinckley Township in Medina County. Although the channel conditions throughout most of the township are similar to those in the lower reach, see Figures 8, 12, 14, and 17, there is more development in the flood plains in this upper reach. In the vicinity of the golf course, Figure 9, the channel banks are clear. As in the lower reach, some residential development has taken place as shown in Figure 10. Channel blockage by fallen trees is more severe in the upper reach as shown in Figures 11 and 13. Channel banks are clear in locations where recreational development has taken place. The picnic grounds just below Hinckley Lake are shown in Figure 15, the boathouse on the west side of Hinckley Lake is shown in Figure 16. A portion of the picnic areas at the headwaters of the lake can be seen on the right side in Figure 17. In addition, channel banks have been cleared near Camp Crag which is located near the Medina-Summit County line.

FIGURE 2 — Brush covered banks and wooded overbanks at river mile 26.98.

FIGURE 3 — View of left overbank looking downstream from Bennett Road bridge at river mile 28.43.

Channel conditions in North Royalton
Photos taken February 1974

FIGURE 4 — Fallen trees in channel at river mile 28.98.

FIGURE 5 — Looking upstream along right bank from Ridge Road bridge at river mile 30.40.

Channel conditions in North Royalton
Photos taken February 1974

FIGURE 6 — Overhanging trees and heavily wooded overbank at river mile 30.46.

FIGURE 7 — View from private road bridge looking upstream left at river mile 30.78.

Channel conditions in North Royalton
Photos taken February 1974

FIGURE 8 — Fallen tree and brush partially clogging channel at river mile 31.16.

Photo taken February 1974

FIGURE 9 — Channel conditions through golf course area at river mile 31.62.

Channel conditions in Hinckley Township
Photo taken March 1973

Obstructions to Flood Flow - Inadequate waterway openings under bridges, and dams and other encroachments and fills in channel and overbank areas are major obstructions to passage of flood flows. Other serious obstructions are bends and irregularities of the channel, heavy brush, weeds, and trees on the channel banks and overbank areas and growth and debris extending into the channel.

Along the study reach of East Branch Rocky River, there has been little encroachment by man other than for highway crossings. Natural obstructions, such as dense growth and trees along the banks and overbank flood plain do occur however, as previously shown in Figures 6, 11 and 13.

Obstructions such as dense growth, debris and fallen trees in the stream channel can be minimized by channel maintenance and cleanup programs. A concentrated effort should be made to prevent throwing of refuse or litter into the stream or along the banks. The local government should establish a floodway, which is the overbank area and stream channel reasonably required to convey the 100-year frequency flood and, as such, should be kept free of obstructions that would interfere with flows and increase flood heights. Floods have occurred in the past and they will undoubtedly occur again. A floodway provides room for flood flows when they come.

Dams and Bridges - The dam which forms Hinckley Lake is in Hinckley Township and is shown in Figure 18. This structure has a concrete overflow section with earth embankments.

Nine bridges cross East Branch Rocky River within the study reach. Eight are public highway bridges and one is a private bridge. Figures 19 through 27 show these structures. Table 2 lists a comparison of pertinent bridge structure elevations to the Intermediate Regional Flood and Standard Project Flood elevations.

Flood Warning and Forecasting Services - Presently there are no specific flood warning or forecasting services for East Branch Rocky River. However, the study area is well within the effective range of the Weather Surveillance Radar operated continuously by the National Weather Service at the Cleveland and Akron-Canton Airport Stations. Weather Service equipment provides for the early detection of a storm and makes possible immediate radio and television broadcasts of information concerning the predicted path and amount of rainfall.

Existing Regulations - In Ohio, the power to adopt and enforce zoning regulations is delegated to political subdivisions. The enabling statutes are within Chapters 303, 519, and 713 of the Ohio Revised Code. None of the political subdivisions within the study area have such regulations in effect.

Section 1521.14 of the Ohio Revised Code requires all departments and agencies of

FIGURE 10 — View from Mattingly Road bridge looking downstream along left bank at river mile 32.74.

FIGURE 11 — Major blockage causing division of channel at river mile 33.40.

Channel conditions in Hinckley Township
Photos taken February 1974

FIGURE 12 — West overbank at river mile 33.93.

FIGURE 13 — Partial channel blockage and small island at river mile 35.35.

Channel conditions in Hinckley Township
Photos taken February 1974

FIGURE 14 — Heavily brushed banks and wooded overbanks looking downstream from Bellus Road bridge, river mile 36.36.

Photo taken June 1973

FIGURE 15 — Upstream view from Bellus Road bridge with Hinckley Dam in background. River mile 36.36. Note picnic grounds along shoreline.

Channel conditions in Hinckley Township
Photo taken February 1974

FIGURE 16 — View of Hinckley Lake from the southwest bank at river mile 37.10. Note boathouse in foreground.

FIGURE 17 — Looking upstream at channel and overbanks at State Road bridge, river mile 37.55.

Channel conditions in Hinckley Township
Photos taken February 1974

the State to notify and furnish to the Division of Water information on State facilities which may be affected by flooding. This information is required in order to avoid the uneconomical, hazardous, or unnecessary use of flood plains in connection with State facilities. The amendment further requires that where economically feasible, departments and agencies of the State and political subdivisions responsible for existing publicly owned facilities, provide flood proofing measures in order to reduce potential flood damage. Through a reorganization of the Department of Natural Resources, the Division of Planning was created which, through its Flood Plain Management Section, is now responsible for implementing this section of the Ohio Revised Code.

Under Executive Order 11296, the Federal government has similar restrictions in that all Federal agencies directly responsible for the construction of Federal facilities must evaluate flood hazards when planning the location of new facilities. In addition, this order requires that Federal agencies responsible for administering Federal grants, loans or mortgage insurance programs evaluate flood hazards in order to minimize potential flood damage and the need for possible future Federal expenditures for flood protection and flood disaster relief.

TABLE 2

BRIDGES ACROSS EAST BRANCH ROCKY RIVER

Station, miles above mouth	Bridge Identification	Elevation in Feet, U.S.C. & G.S. Datum				
		Approximate Stream Bed	Approximate Low Steel	Approximate Bridge Floor	Intermediate Regional Flood[1]	Standard Project Flood[1]
25.85	West 130th St.	811.6	825.8	830.4	823.5	829.0
28.43	Bennett Road	827.3	839.7	844.4	839.9	847.4
30.40	Ridge Road	838.2	850.4	854.5	851.5	854.6
30.78	Private Road	841.9	853.5	854.5	853.6	856.3
31.15	Boston Road	843.4	857.9	860.5	855.5	860.1
32.74	Mattingly Road	858.4	871.8	873.2	870.7	874.3
35.32	Route 303	878.4	890.7	891.9	886.7	893.5
36.36	Bellus Road	892.8	904.4	905.8	900.8	906.6
37.55	State Road	919.8	925.8	927.8	928.0	931.3

[1]Elevations refer to upstream side of respective bridge at its center line.

FIGURE 18 — Hinckley Dam and swimming area, river mile 36.49.

Photo taken June 1973

FIGURE 19 — View of upstream face of West 130th Street bridge looking downstream. River mile 25.85.

Highway Bridge
Photo taken March 1973

FIGURE 20 — Looking downstream at upstream face of Bennett Road bridge at river mile 28.43.

Highway Bridge
Photo taken March 1973

FIGURE 21 — Ridge Road bridge at river mile 30.40 looking downstream at upstream face.

Highway Bridge
Photo taken February 1974

FIGURE 22 — View of private road bridge looking upstream at river mile 30.78.

FIGURE 23 — Boston Road bridge at river mile 31.15. Looking downstream at upstream face.

Highway Bridges
Photos taken March 1973

FIGURE 24 — Looking upstream at downstream face of Mattingly Road bridge. River mile 32.74.

FIGURE 25 — View of downstream face of Route 303 bridge at river mile 35.32.

Highway Bridges
Photos taken March 1973

FIGURE 26 — Bellus Road bridge at river mile 36.36. Downstream view of upstream face.

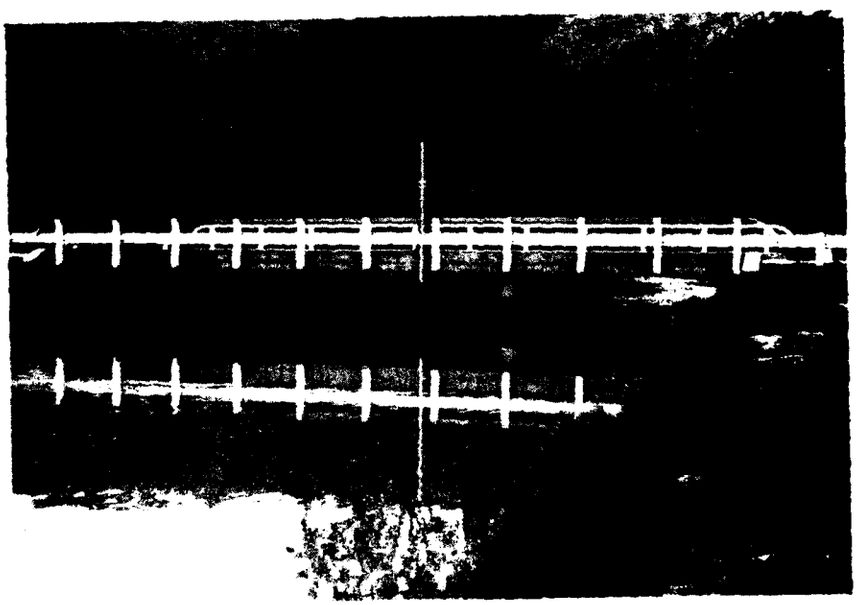


FIGURE 27 — Looking at an upstream view of the *downstream face of* State Road bridge. River mile 37.55.

Highway Bridges
Photos taken June 1973

Aid to Flood Victims - The Disaster Relief Act of 1970 (Public Law 91-606) provides assistance to communities and persons located in flood hazard areas in the event of a declared major disaster. The Act provides for various types of aid prior to, during, and after the disaster.

The National Flood Insurance Act of 1968 (Public Law 90-448) provides Federally-subsidized, low-cost flood insurance to property owners in any community that meets the eligibility requirements. In order to obtain flood insurance eligibility, the localities involved must adopt various land use controls and regulations affecting flood plains. The Flood Disaster Protection Act of 1973 (PL 93-234) now requires States and those communities identified as having "special flood hazard" areas, as a condition of future Federal financial assistance, to participate in the flood insurance program.

Record of Floods

Information pertaining to past floods in this reach of East Branch Rocky River is extremely scarce. A search of newspaper files and interviews with local officials in the area disclosed only one high water mark. The 1959 flood reached the edge of the boathouse at Hinckley Lake shown in Figure 16.

FUTURE FLOODS

Great floods have been experienced on streams in the general geographical region of this study. Similar climatological conditions to those causing such large floods could occur over the East Branch Rocky River watershed and, in all probability, will occur sometime in the future. The purpose of this section is to delineate those areas that would be inundated by floods of a given magnitude and set forth additional information to help communities develop a plan for reducing the extent of future flood damages.

Extent of Flooding

Intermediate Regional Flood - The Intermediate Regional Flood is defined as a flood having a recurrence interval of once in 100 years at a designated location. However, this is based on a statistical analysis and the flood may actually occur in any year or even in consecutive years. Data for this flood on East Branch Rocky River is shown in Table 3. The Intermediate Regional Flood is recommended by the State of Ohio Department of Natural Resources as the minimum flood level to define the limits of the regulatory flood plain. That is, development within these limits should be regulated by local ordinances so as to reduce flood damage potential. The Federal Insurance Administration of the Department of Housing and Urban Development uses like criteria for the flood insurance program.

Standard Project Flood - The Corps of Engineers, with the cooperation of the National Weather Service, has made broad and comprehensive studies and investigations of storms and floods and has developed generalized procedures for estimating the flood potential of streams. These procedures have been used in determining the Standard Project Flood, which is defined as the largest flood that can be expected from the most severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geographical region involved. Only in rare instances would such a storm occur on any specific region. Table 3 summarizes pertinent data for the Standard Project Flood.

There is no frequency assigned to this flood since it is developed from generalized rainfall-runoff data rather than streamflow records. The occurrence of such a flood would indeed be a rare event, however, it could occur in any year. This flood is not the maximum flood that could occur, but it does indicate a reasonable upper limit of the flood plain.

Larger Floods - While larger floods are theoretically possible, the usual climatological characteristics required to produce such a flood would seldom exist. The minimum risk from possible future flood damages that a community is willing to accept should be considered in establishing regulatory flood plain limits or planning for development.

TABLE 3

INTERMEDIATE REGIONAL FLOOD AND STANDARD PROJECT FLOOD DISCHARGES AND AVERAGE VELOCITIES

Stream Mile	Discharge cfs	Average Velocity[1] feet per second	
		Channel	Overbank
	Intermediate Regional Flood		
25.85 - 26.75	7,300	7.6	1.0
26.75 - 29.15	6,600	7.0	1.1
29.15 - 30.30	6,000	6.2	1.5
30.30 - 32.00	5,500	7.3	1.4
32.00 - 34.25	5,000	6.3	1.4
34.25 - 35.80	4,500	6.9	2.2
35.80 - 37.10	3,900	4.2	1.5
37.10 - 38.20	3,700	5.5	1.3
38.20 - 38.90	3,500	8.0	1.9
38.90 - 39.80	3,100	8.4	1.5
	Standard Project Flood		
25.85 - 26.75	22,300	7.9	1.8
26.75 - 29.15	20,200	7.6	2.1
29.15 - 30.30	18,400	6.0	2.5
30.30 - 32.00	16,900	8.8	2.4
32.00 - 34.25	15,400	8.3	2.8
34.25 - 35.80	13,900	6.7	3.8
35.80 - 37.10	11,900	5.4	2.2
37.10 - 38.20	11,400	7.5	2.3
38.20 - 38.90	10,500	11.2	3.4
38.90 - 39.80	9,200	9.5	3.2

[1]Average velocities within the indicated reach of stream.

Areas and Depths of Flooding - Areas that would be flooded by the Intermediate Regional and Standard Project Floods are delineated on Plates 3, 4 and 5. An index map of the vicinity is shown on Plate 2. The overflow areas were determined with an accuracy consistent with the objectives of the study and accuracy of available data. Actual limits of the flooded areas may vary somewhat from those shown on the map because the 10-foot contour interval and scale of the map do not permit precise plotting of the flooded area boundaries.

Plates 6 through 9 show the water surface profiles for both floods. The depth of flow in the channel can be estimated at any point from these plates. Determination of these flood

profiles was predicated on the assumption that all structures would remain in place throughout the flood and that no accumulation of debris would further restrict waterway openings or block the channel.

The lateral extent of channel overflow at typical cross sections is shown on Plates 10, 11, and 12. Depth of flow outside of the channel resulting from either flood can be estimated from these illustrations.

Approximate depths of flooding that would be experienced within the flood plain of the East Branch Rocky River that is covered by this report by the occurrence of the Intermediate Regional and the Standard Project Floods are shown in Figures 28 through 33 inclusive.

Velocity of Flood Waters - Average velocity of flood waters depends on the size and shape of the cross section, conditions of the stream and the bed slope of the channel, all of which vary along the stream. Table 3 lists the average velocities that may be expected for peak discharges of the Standard Project and Intermediate Regional Floods. Velocities greater than three feet per second combined with depths of three feet or greater are generally considered hazardous to life and property.

The accumulation of ice or debris at constricted sections of the channel may affect the characteristics of flood flow. Such accumulation acts as a dam and causes water to back up forming a pond. If sufficient head accumulates to break the dam, a surge of water would flow downstream causing an increase in both the discharge and velocity values. Since the occurrence and amount of accumulation are indeterminate factors, the values in Table 3 do not reflect such conditions.

Reducing the Damages

The information contained in this report will not by itself reduce the flood damage potential. Local action will be required to implement a flood plain management program in order to curb the rise of potential flood damages. Although specific plans are not set forth for the study area, several agencies provide assistance to the local sector in developing a workable plan for reduction of flood damages and wise use of the flood plains.

State Assistance - The Ohio Department of Natural Resources, Division of Planning, Flood Plain Management Section administers Ohio's flood plain management program. The major objective of the program is to ensure the wise use of Ohio's flood plain areas. They perform various functions including collection of flood data, special analysis of flood hazard sites, and development of model ordinances and regulations for flood plain use.

FIGURE 28 — Heights of the Standard Project and Intermediate Regional Floods are shown by arrows on this home on Bennett Road, river mile 28.5.

FIGURE 29 — Heights of the Standard Project and Intermediate Regional Floods are shown by arrows on this home on Mattingly Road, river mile 32.7.

Possible future flood heights
Photos taken April 1974

FIGURE 30 — Heights of flooding at Mattingly Road bridge, river mile 32.74, are shown by the arrows for the Standard Project and Intermediate Regional Floods.

FIGURE 31 — Heights of flooding at Hinckley Lake dam, river mile 36.49 are shown by the arrows for the Standard Project and Intermediate Regional Floods.

Possible future flood heights
Photos taken April 1974

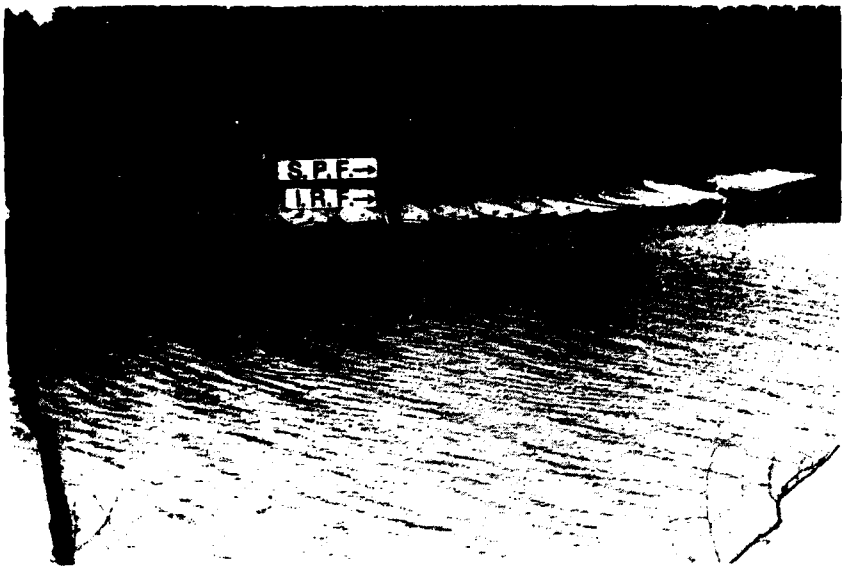


FIGURE 32 — Heights of the Standard Project and Intermediate Regional Floods are shown by the arrows at the Hinckley Lake boathouse, river mile 37.1.

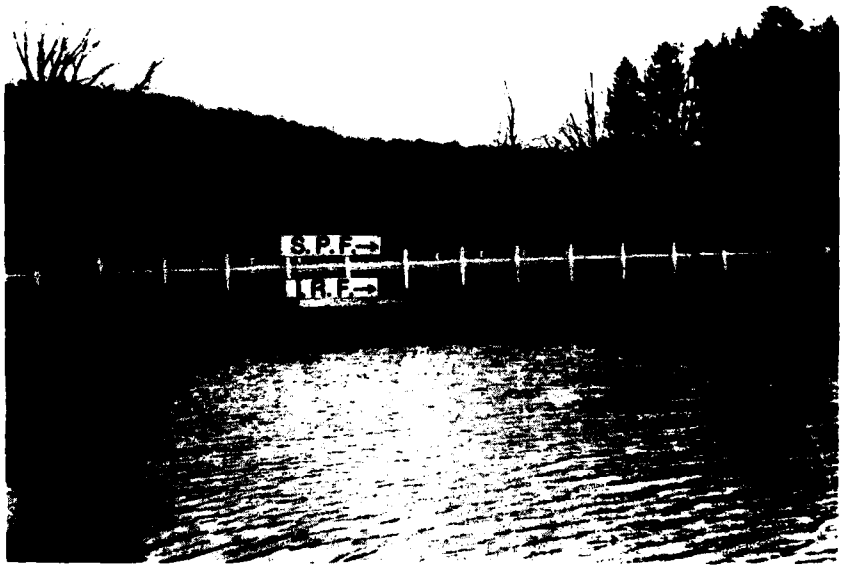


FIGURE 33 — Heights of the Standard Project and Intermediate Regional Floods are shown by the arrows at the State Road bridge, river mile 37.55.

Possible future flood heights
Photos taken April 1974

This program is directed at the local level since the power to control the use of flood plains lies with the local governments in Ohio. Technical data and planning assistance is provided to local communities requesting help. The Flood Plain Management Section is also the State Coordinating Agency for the National Flood Insurance Program. Information is provided on the insurance program and local communities are assisted in establishing eligibility for flood insurance.

Federal Assistance - The Department of Housing and Urban Development administers the National Flood Insurance Program. Currently, none of the communities in the study area are eligible. Both the U.S. Soil Conservation Service and U.S. Geological Survey are active in and coordinate flood control programs with the State.

The Corps of Engineers also maintains a Flood Plain Management Services program. Information, guidance and advice on flood hazards and the wise use of flood plains are available to Federal, State and local agencies. The program includes preparation of this and other flood plain information studies and provision of technical assistance for the collection, preparation, and analysis of flood data. Guidelines and pamphlets pertaining to flood plain regulations, flood proofing, and other related subjects are available to public and governmental interests. Comprehensive flood damage prevention planning is also available through this program.

To assist local governments in managing and controlling their flood plains, the U.S. Army Corps of Engineers has prepared and will, upon request, distribute to State, county and local governments copies of pamphlets entitled, "Guidelines for Reducing Flood Damages" and "Introduction to Flood Proofing." These pamphlets together with information presented in this report should provide a base upon which local governments may develop a sound program to reduce damage to existing and future development within the flood plain of East Branch Rocky River in Cuyahoga and Medina Counties, Ohio. Figure 34 lists the corrective and preventive measures described in the above mentioned pamphlets. The U.S. Army Corps of Engineers will distribute to State, county and local governments other helpful pamphlets as well as additions to existing pamphlets as they are developed.

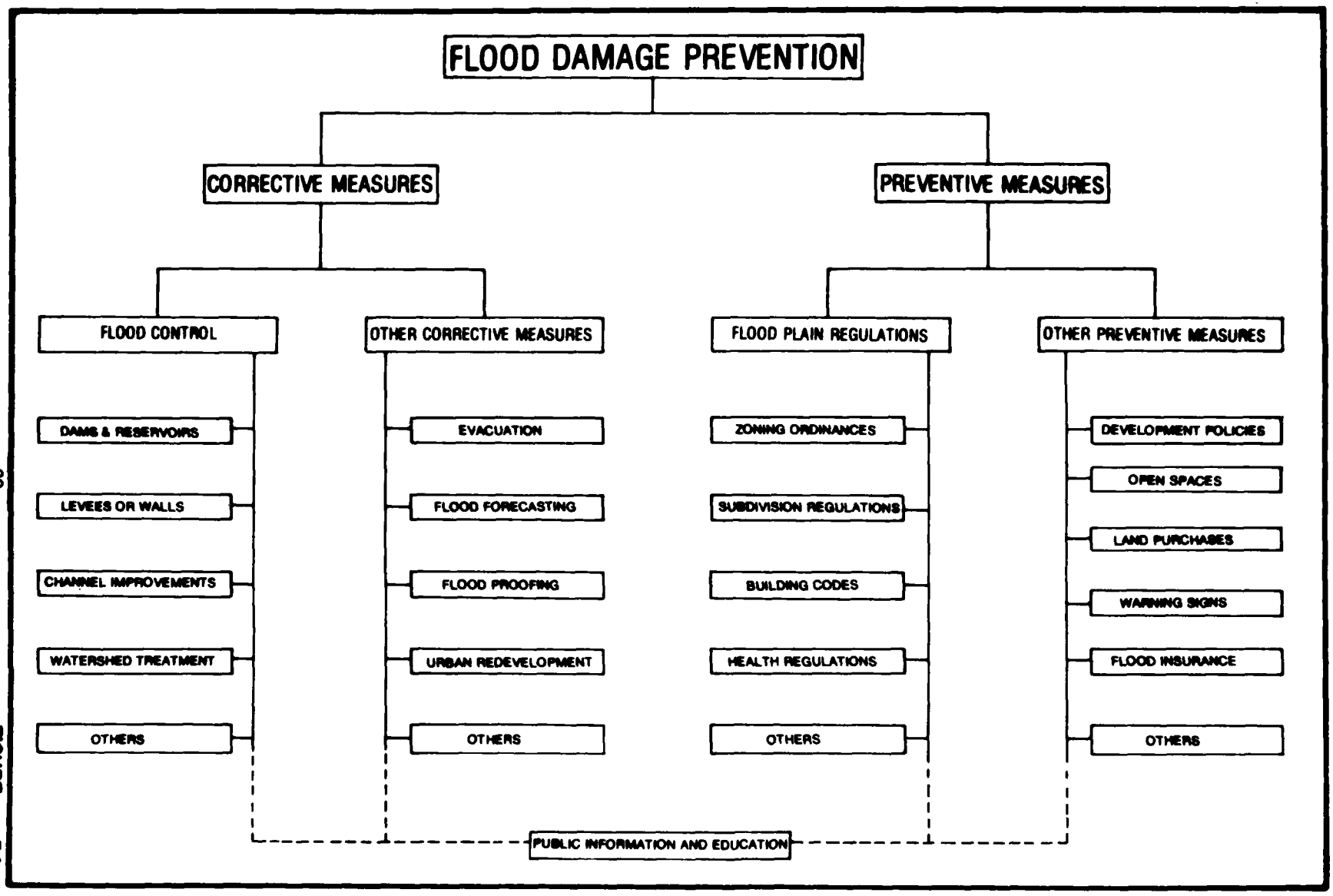


FIGURE 34

Flood damage prevention measures

GLOSSARY OF TERMS

Discharge. The quantity of flow in a stream at any given time, usually measured in cubic feet per second (cfs).

Flood. An overflow of lands not normally covered by water and that are used or usable by man. Floods have two essential characteristics: The inundation of land is temporary; and the land is adjacent to and inundated by overflow from a river or stream or an ocean, lake, or other body of standing water.

Normally, a "flood" is considered as any temporary rise in streamflow or stage, but not the ponding of surface water, that results in significant adverse effects in the vicinity. Adverse effects may include damages from overflow of land areas, temporary backwater effects in sewers and local drainage channels, creation of unsanitary conditions or other unfavorable situations by deposition of materials in stream channels during flood recessions, rise of groundwater coincident with increased streamflow, and other problems.

Flood Crest. The maximum stage or elevation reached by the waters of a flood at a given location.

Flood Peak. The maximum instantaneous discharge of a flood at a given location. It usually occurs at or near the time of the flood crest.

Flood Plain. The relatively flat area or low lands adjoining the channel of a river, stream, or watercourse or ocean, lake, or other body of standing water which has been or may be covered by flood water.

Flood Profile. A graph showing the relationship of water surface elevation to location, the latter generally expressed as distance above mouth, for a stream of water flowing in an open channel. It is generally drawn to show surface elevation for the crest of a specific flood, but may be prepared for conditions at a given time or stage.

Flood Stage. The stage or elevation at which overflow of the natural banks of a stream or body of water begins in the reach or area in which the elevation is measured.

Head Loss. The effect of obstructions, such as narrow bridge openings or buildings that limit the area through which water must flow, raising the surface of the water upstream from the obstruction.

Hydrograph. A curve denoting the discharge or stage of flow over a period of time.

Intermediate Regional Flood. A flood having an average frequency of occurrence in the order of once in 100 years although the flood may occur in any year. It is based on statistical analyses of streamflow records available for the watershed and analyses of rainfall and runoff characteristics in the "general region of the watershed."

Left Bank. The bank on the left side of a river, stream, or watercourse, looking downstream.

Low Steel (or Underclearance). See "underclearance".

Right Bank. The bank on the right side of a river, stream, or watercourse, looking downstream.

Standard Project Flood. The flood that may be expected from the most severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the geographical area in which the drainage basin is located, excluding extremely rare combinations. Such floods, as used by the Corps of Engineers, are intended as practicable expressions of the degree of protection that should be sought in the design of flood control works, the failure of which might be disastrous.

Underclearance. The lowest point of a bridge or other structure over or across a river, stream, or watercourse that limits the opening through which water flows. This is referred to as "low steel" in some regions.

AUTHORITY, ACKNOWLEDGMENTS AND INTERPRETATION OF DATA

This report has been prepared by Burgess & Niple, Limited under the direction of the Buffalo District of the U.S. Army Corps of Engineers in accordance with the authority granted by Section 206 of the Flood Control Act of 1960 (PL 86-465) as amended.

* * *

Assistance and cooperation of Federal, State and local agencies in supplying useful information is appreciated.

* * *

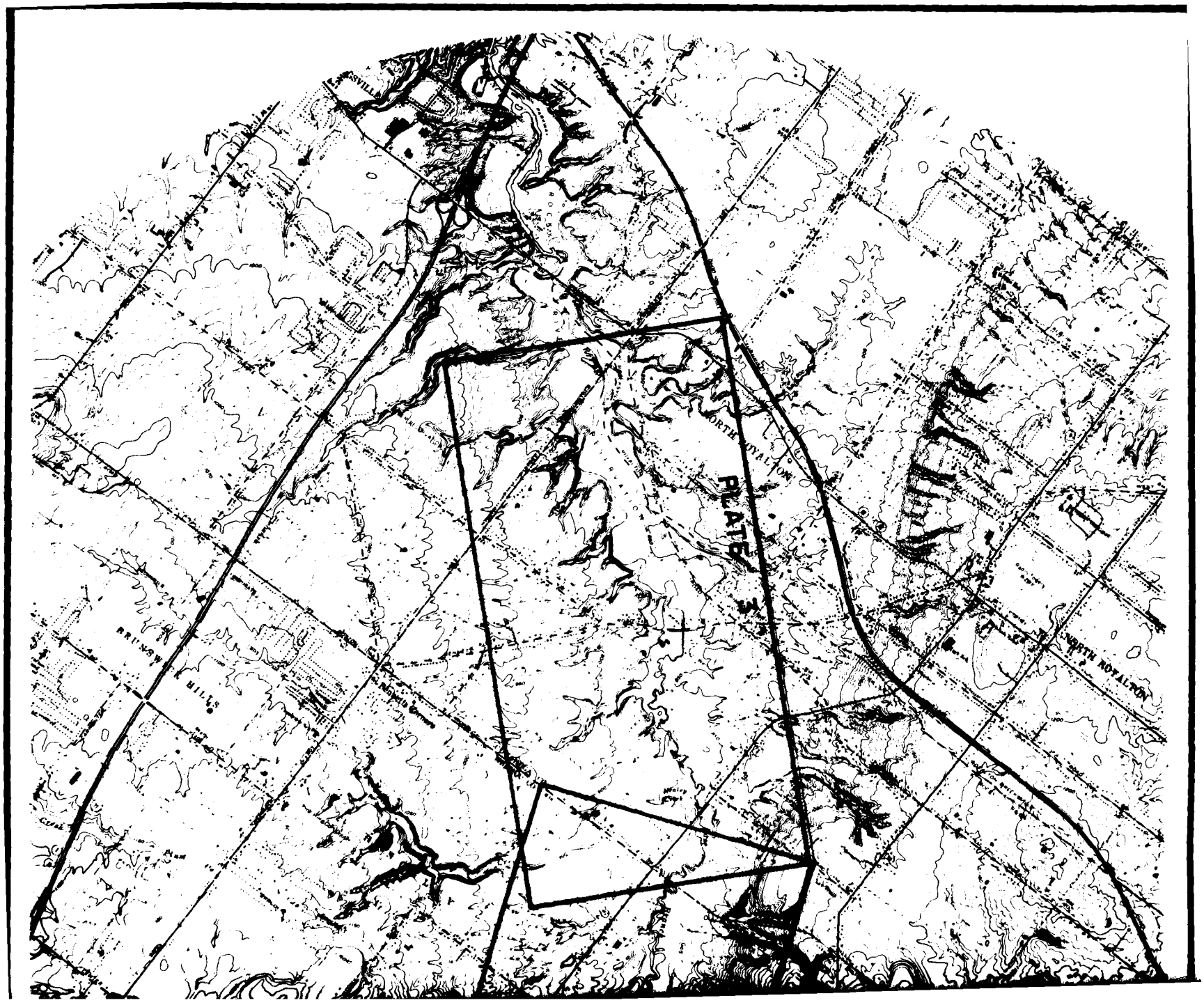
The Buffalo District will provide, upon request, interpretation and limited technical assistance in the application of these data, particularly as to their use in developing effective flood plain regulations. Requests should be coordinated through the Ohio Department of Natural Resources, Division of Planning. After local authorities have selected the flood magnitude or frequency to be used as the basis for regulation, further information on the effects of various widths of floodway on the profile of the selected flood can be provided to assist in final selection of floodway limits.

BENCH MARKS[1] ON EAST BRANCH ROCKY RIVER IN CITY OF NORTH ROYALTON & HINCKLEY TOWNSHIP CUYAHOGA AND MEDINA COUNTIES, OHIO

Bench Mark Designation & Approximate River Mile	Elevation[2] Feet on U.S.C. & G.S. Datum	Description
Bridge 1 25.85	830.44	A chiseled square on top of concrete abutment at N.W. corner of W. 130th Street bridge over Rocky River.
Bridge 2 28.43	845.10	A chiseled cross on top of concrete abutment at N.E. corner of Bennett Road bridge over Rocky River.
Bridge 3 30.40	854.58	Top of bronze disc at the N.E. corner of the Ridge Road bridge over Rocky River; marked TT 33G 1935.
Bridge 4 30.78	853.34	A chiseled square on top of concrete abutment at S.W. corner of unimproved road bridge over Rocky River.
BM OM 826 31.15	879.83	N.E. corner of Ridge and Boston Roads.
Bridge 5 31.15	860.87	A chiseled cross on top of steel channel iron support beam at abutment at N.W. corner of Boston Road bridge.
Bridge 6 32.74	872.61	A chiseled square on top of concrete abutment at N.W. corner of Mattingly Road bridge.
Bridge 7 35.32	891.75	A chiseled square on top of concrete abutment at N.E. corner of Route 303 bridge.
Bridge 8 36.36	905.66	A chiseled square on top of concrete abutment at S.W. corner of Bellus Road bridge.
B.M. Dam 36.49	930.76	A chiseled square on top of concrete wingwall at west end of Hinckley Lake dam.
Bridge 9 37.55	928.51	A chiseled square on top of concrete abutment at N.E. corner of State Road bridge over Rocky River.

[1]Bench Mark - A point of known elevation, usually a mark cut into some durable material as stone or concrete, to serve as a reference point in running a line of levels for the determination of elevations. The list is furnished as an aid to local interests in setting minimum elevations for future development or establishing other elevations necessary to flood plain planning.

[2]Elevations established by Corps of Engineers during field surveys in February, March 1973 and May, June 1973 and recorded in field books numbered RR 38A and RR 38B.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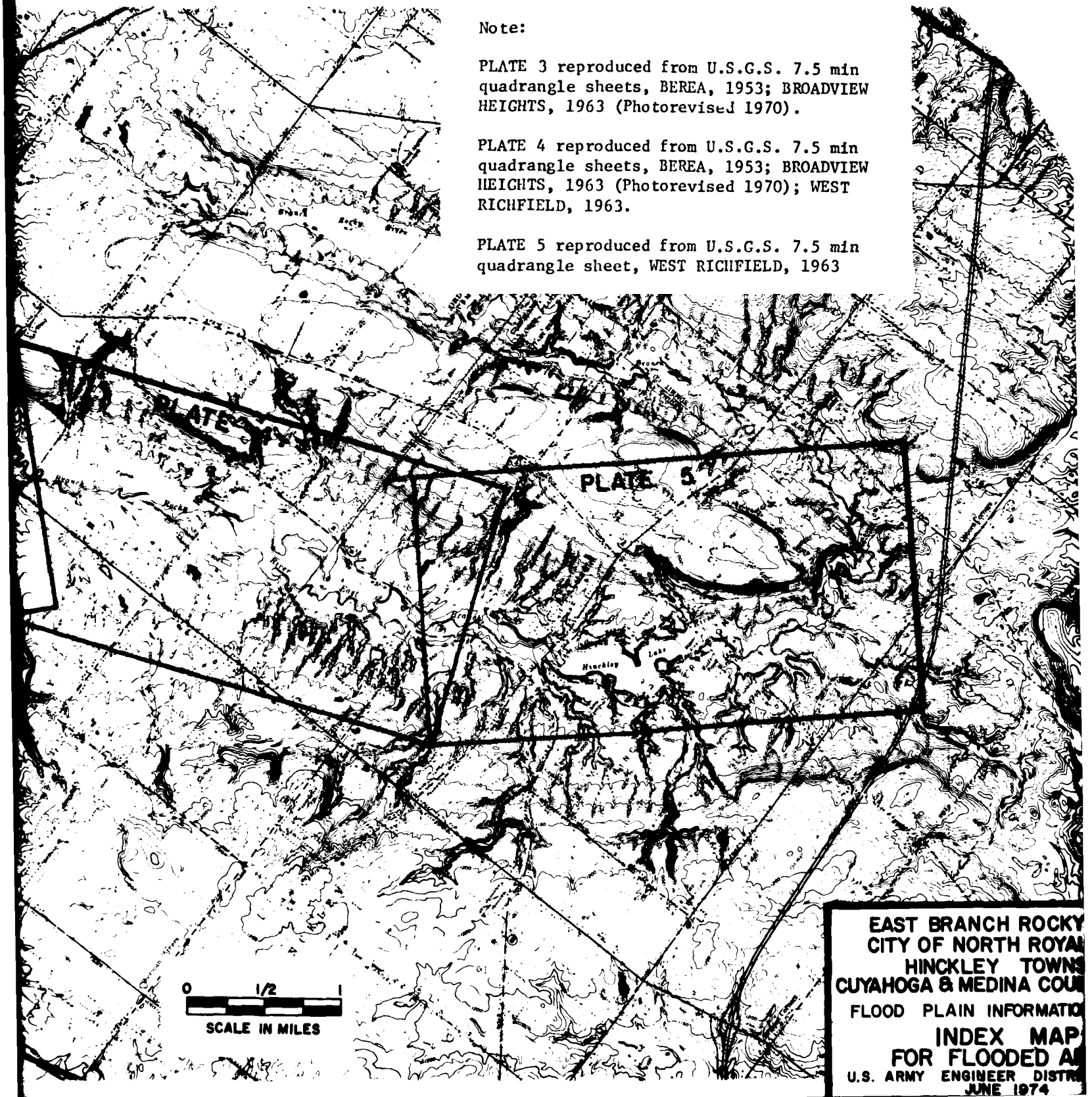

Note:

PLATE 3 reproduced from U.S.G.S. 7.5 min quadrangle sheets, BEREA, 1953; BROADVIEW HEIGHTS, 1963 (Photorevised 1970).

PLATE 4 reproduced from U.S.G.S. 7.5 min quadrangle sheets, BEREA, 1953; BROADVIEW HEIGHTS, 1963 (Photorevised 1970); WEST RICHFIELD, 1963.

PLATE 5 reproduced from U.S.G.S. 7.5 min quadrangle sheet, WEST RICHFIELD, 1963

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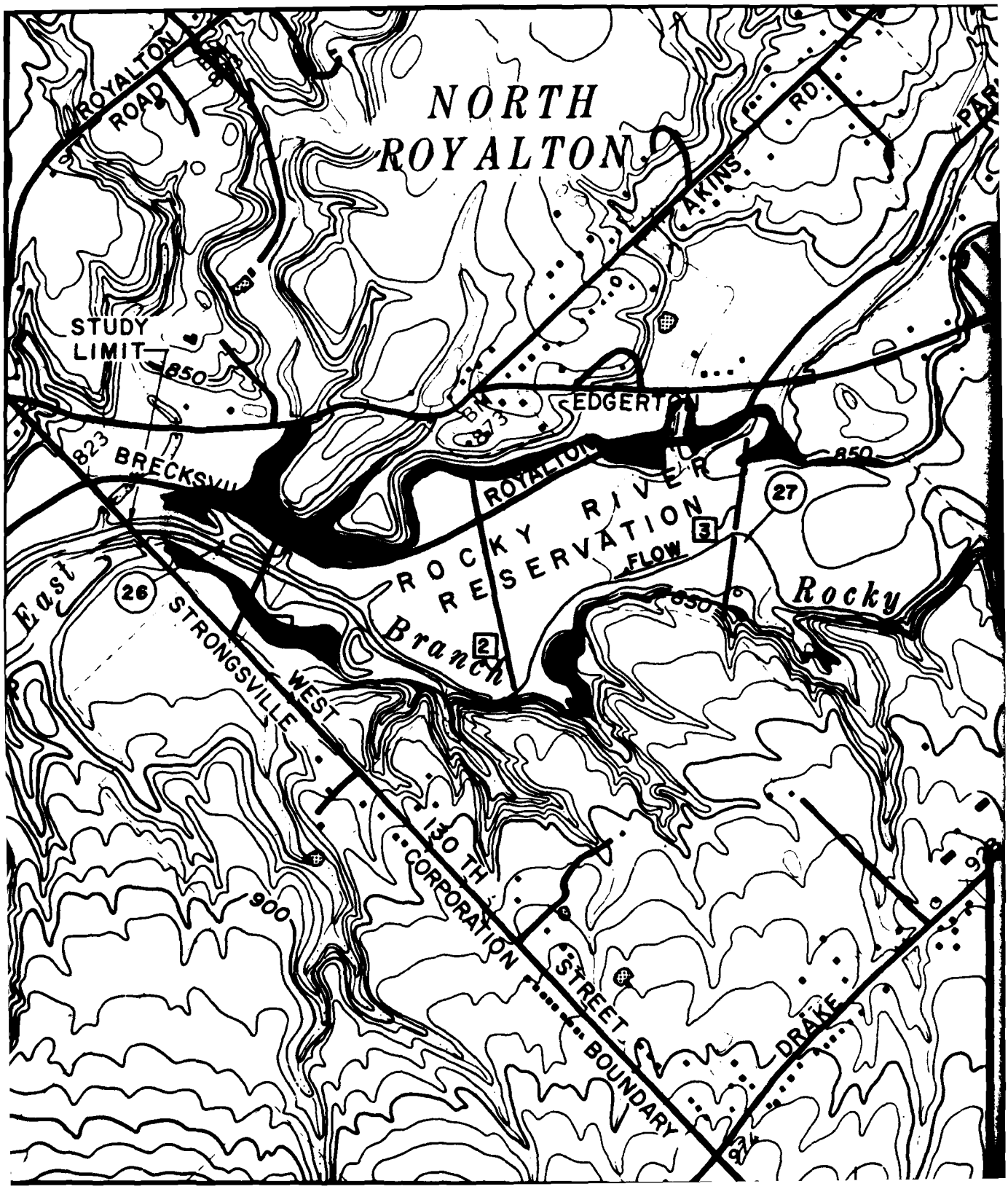
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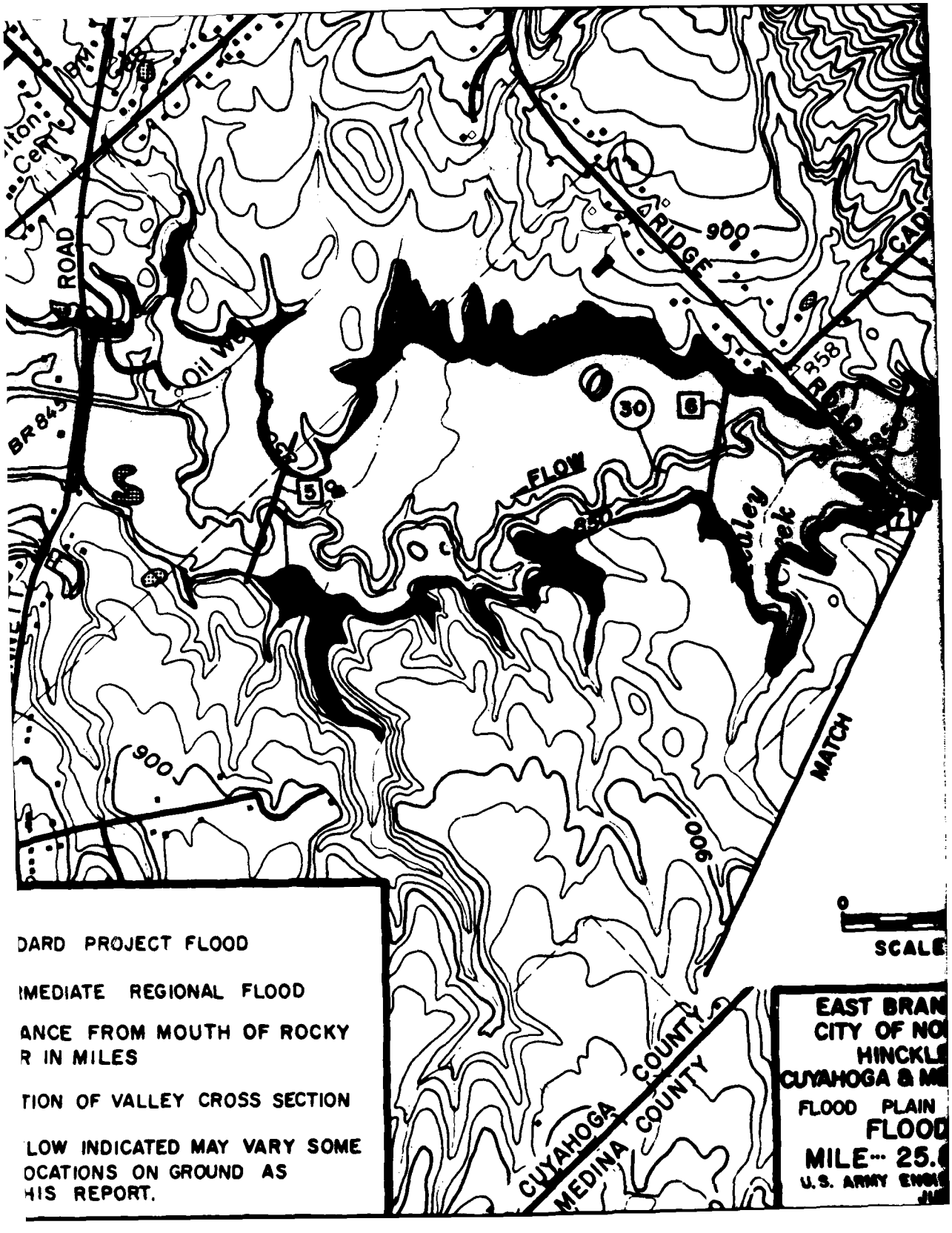
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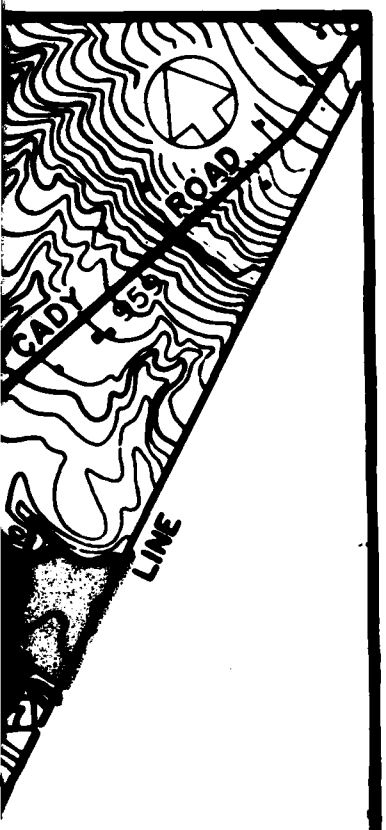

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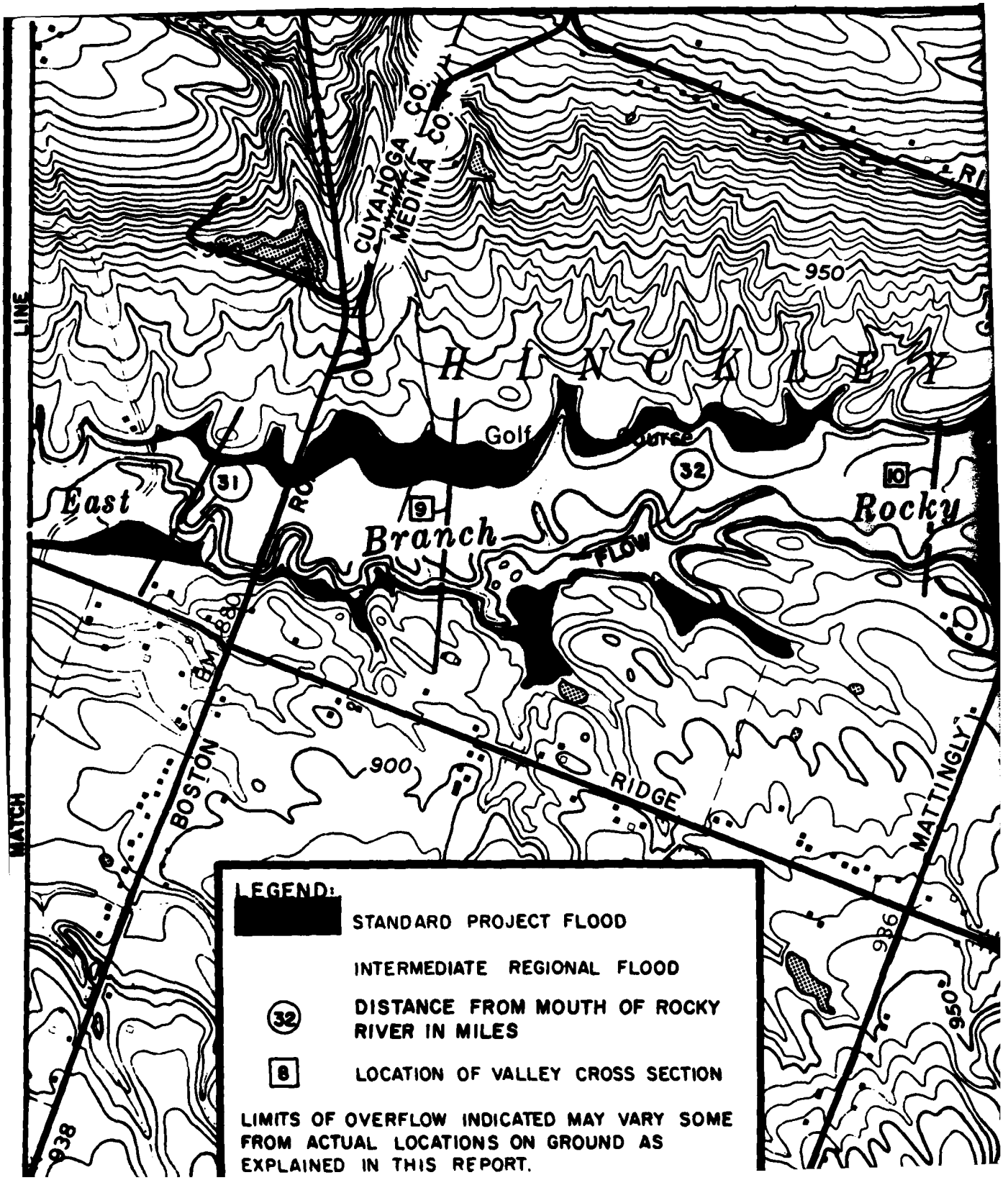
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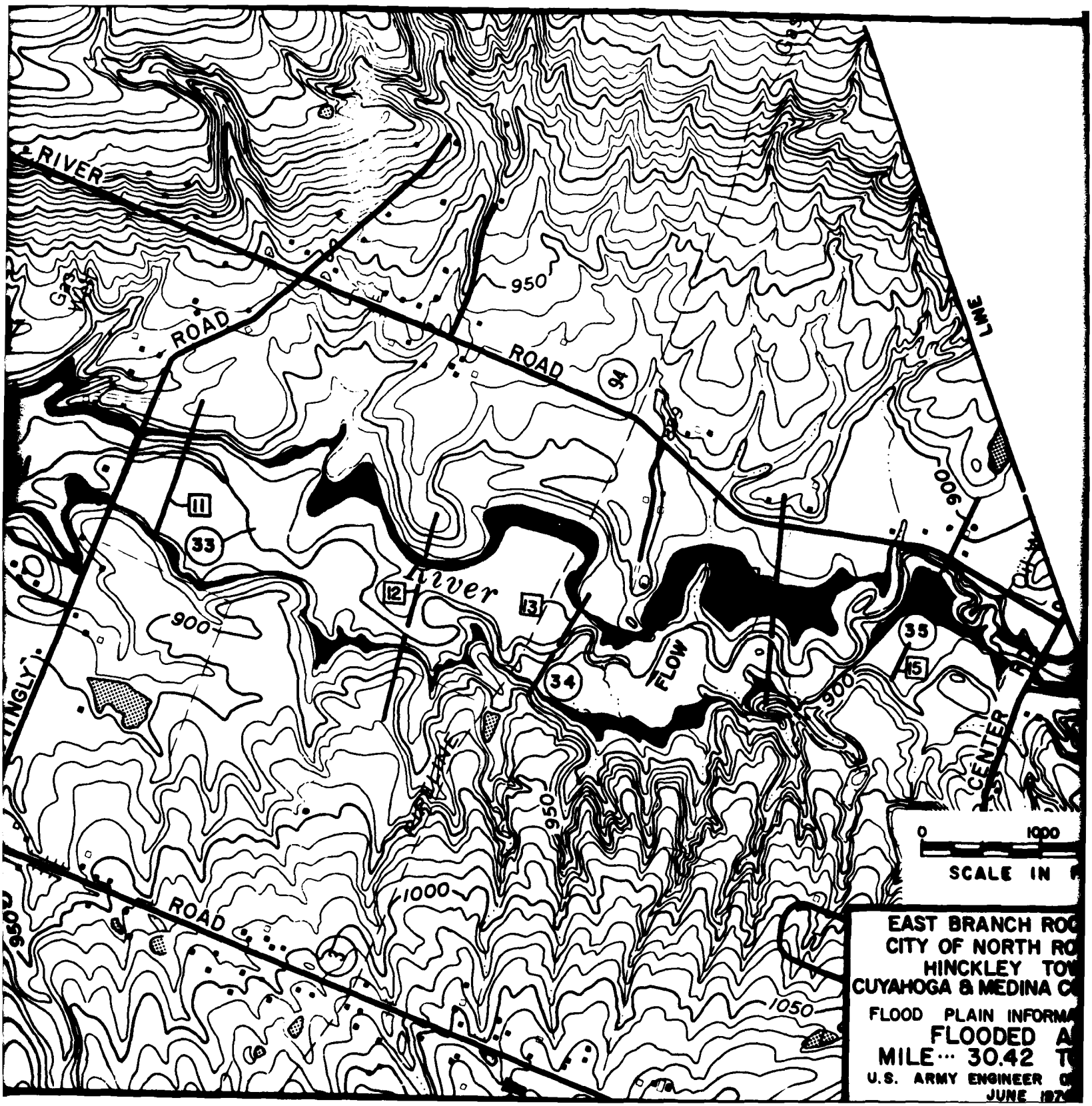
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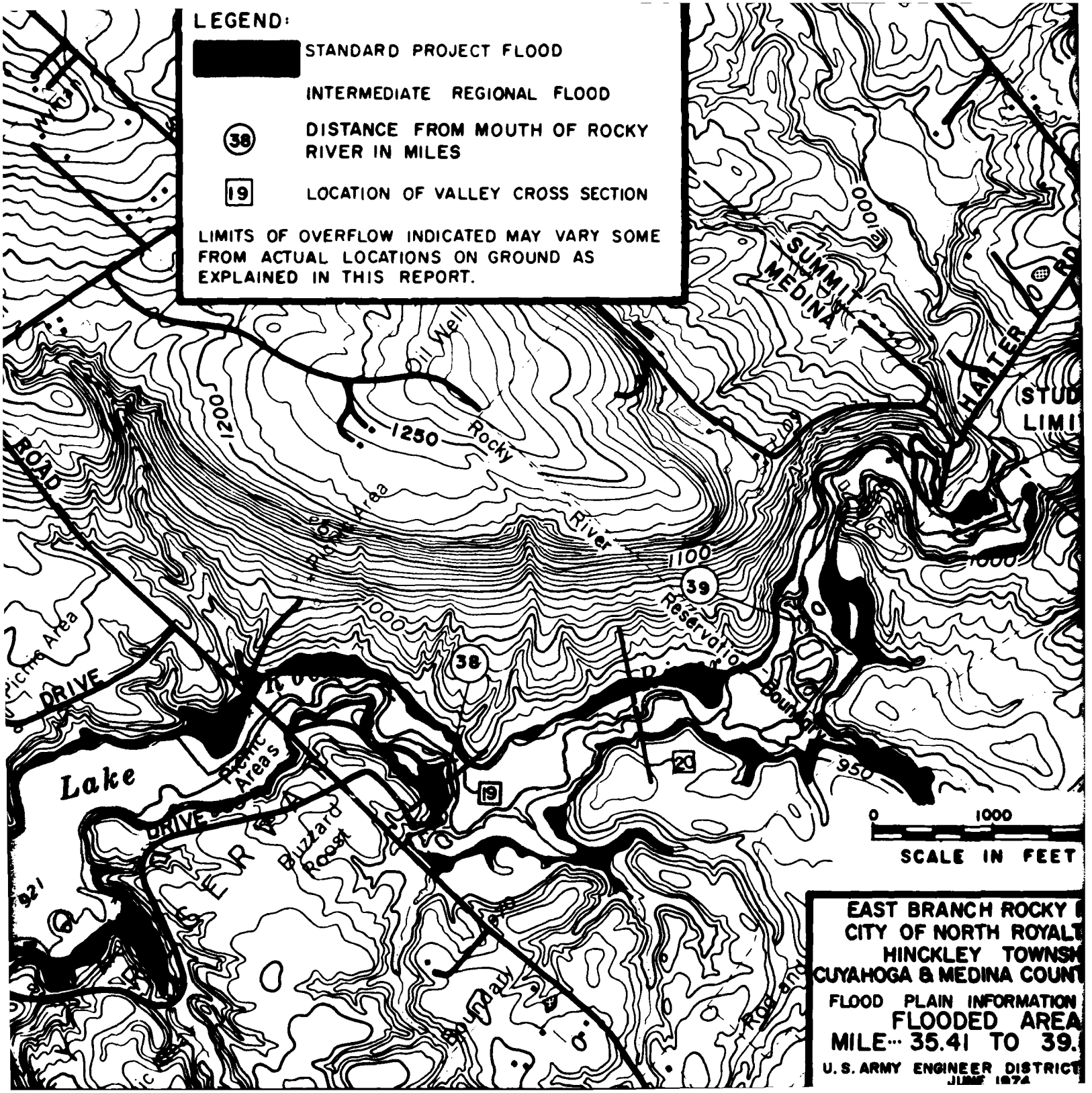
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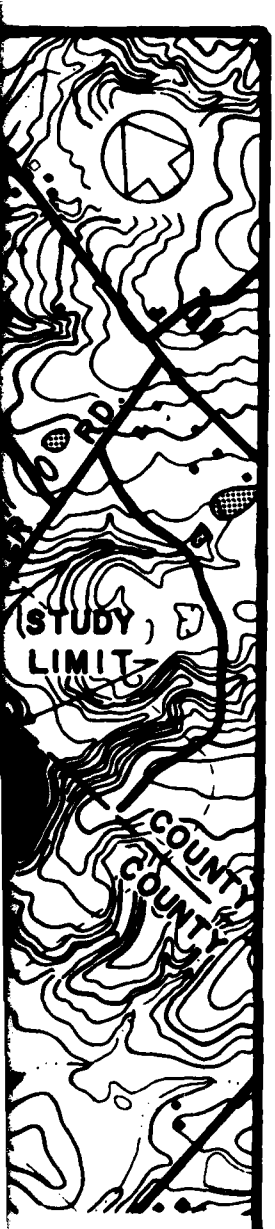

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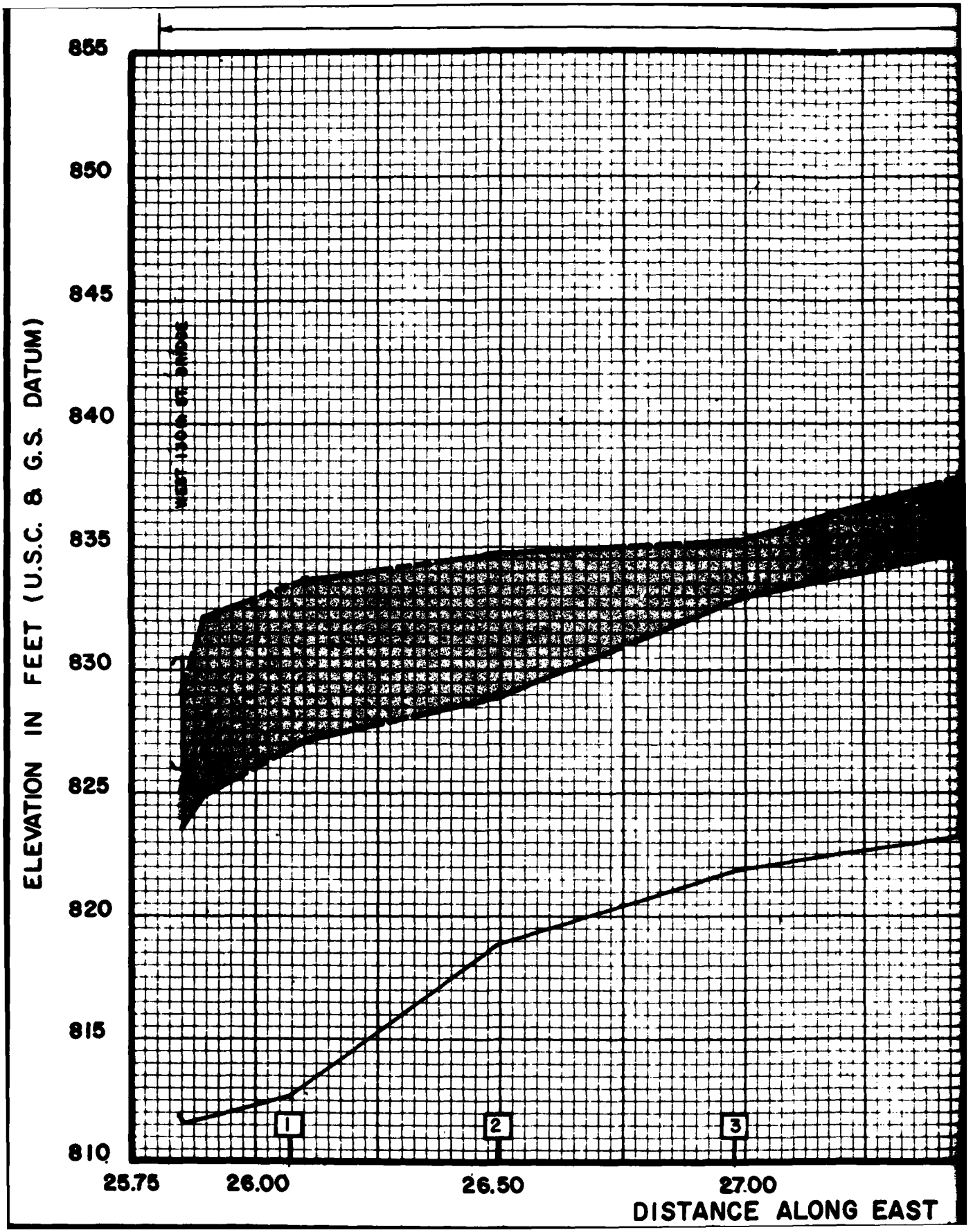
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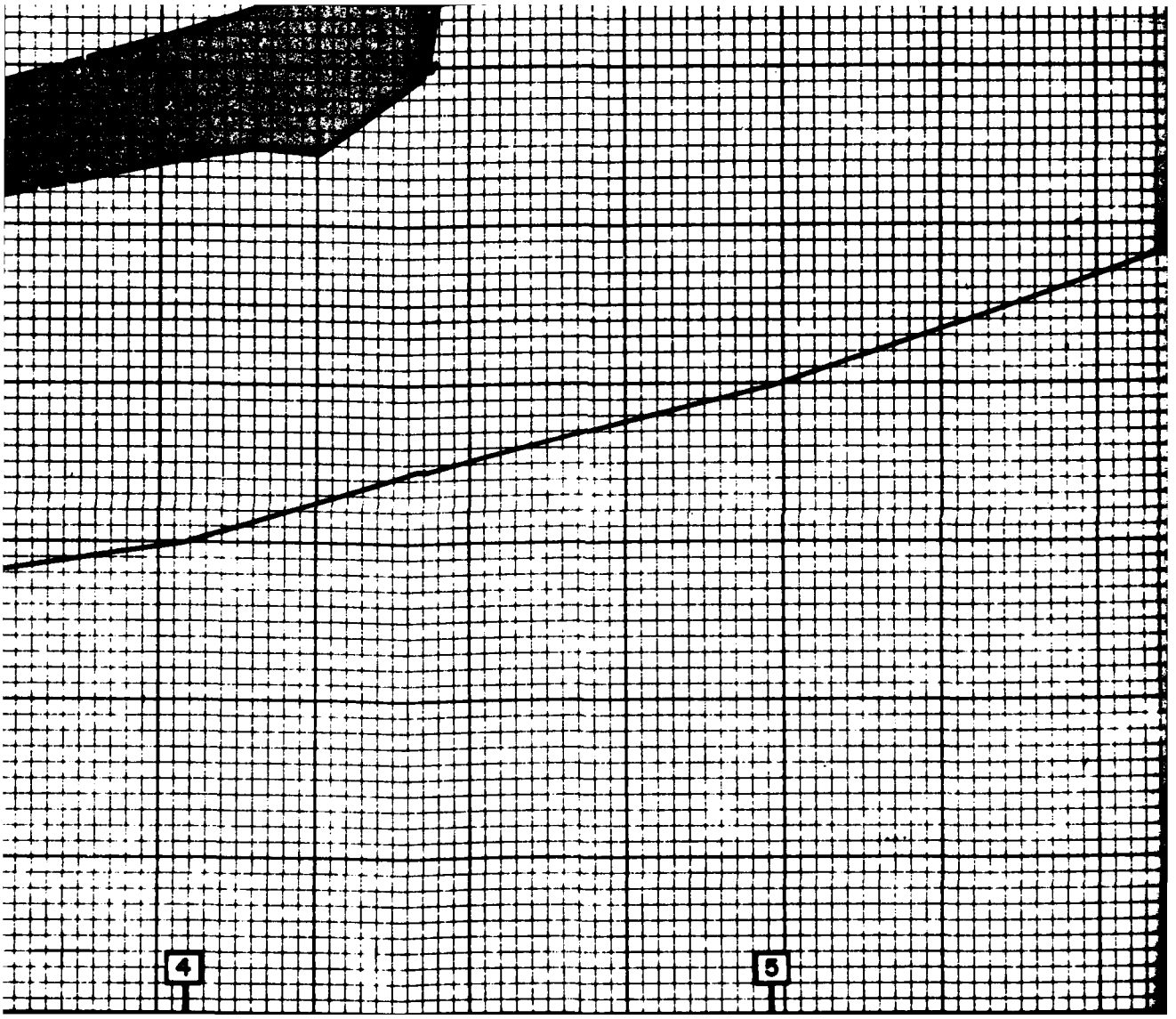
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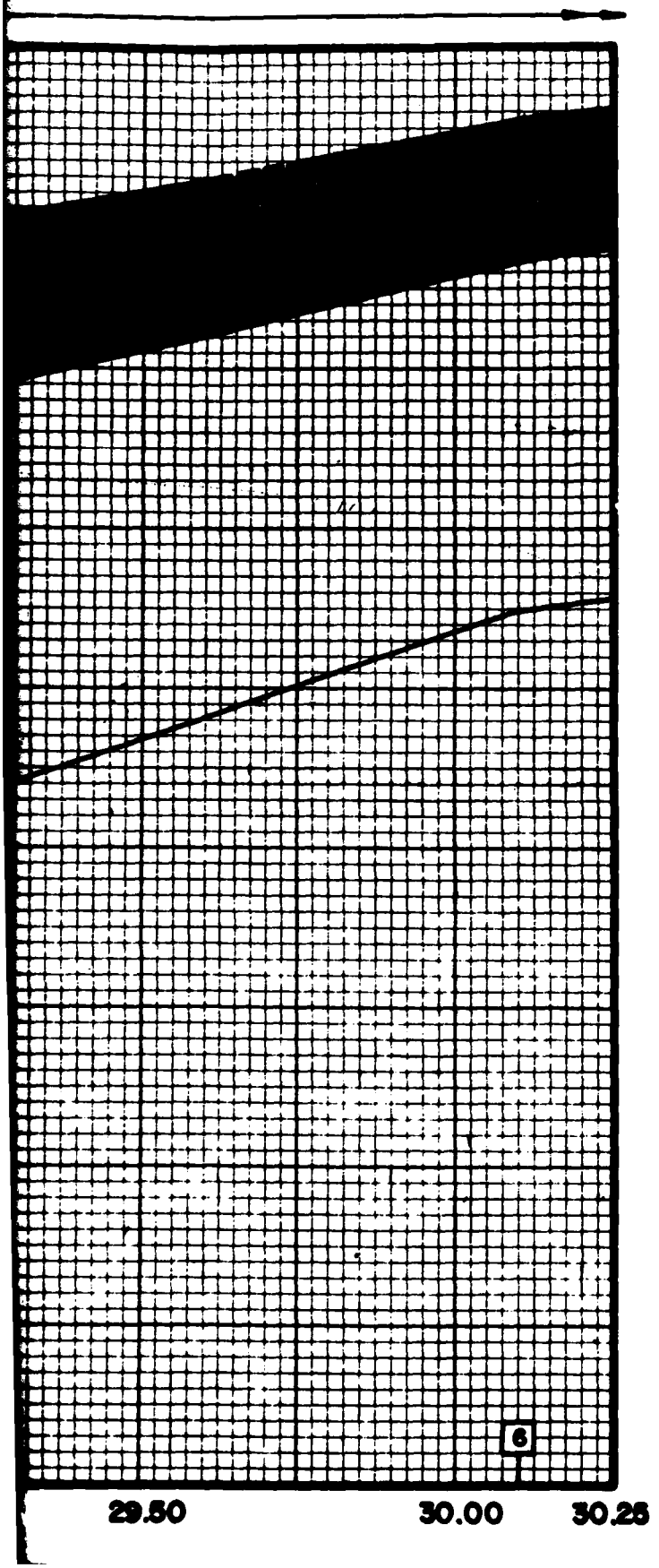

LEGEND:

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INTERMEDIATE REGIONAL FLOOD

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APPROXIMATE BRIDGE FLOOR ELEVATION

APPROXIMATE LOW STEEL ELEVATION

5 LOCATION OF VALLEY CROSS SECTION

NOTES:

FLOOD PROFILES ARE BASED ON THE FOLLOWING:

1. EXISTING CHANNEL CONDITIONS
2. EXISTING STRUCTURES
3. EXISTING CONDITIONS OF DEVELOPMENT

LARGE SCALE FILLING WILL RAISE PROFILES UNLESS SUFFICIENT FLOODWAY IS PROVIDED.

EAST BRANCH ROCKY RIVER
CITY OF NORTH ROYALTON & HINCKLEY TOWNSHIP
CUYAHOGA & MEDINA COUNTIES, OHIO

FLOOD PLAIN INFORMATION REPORT

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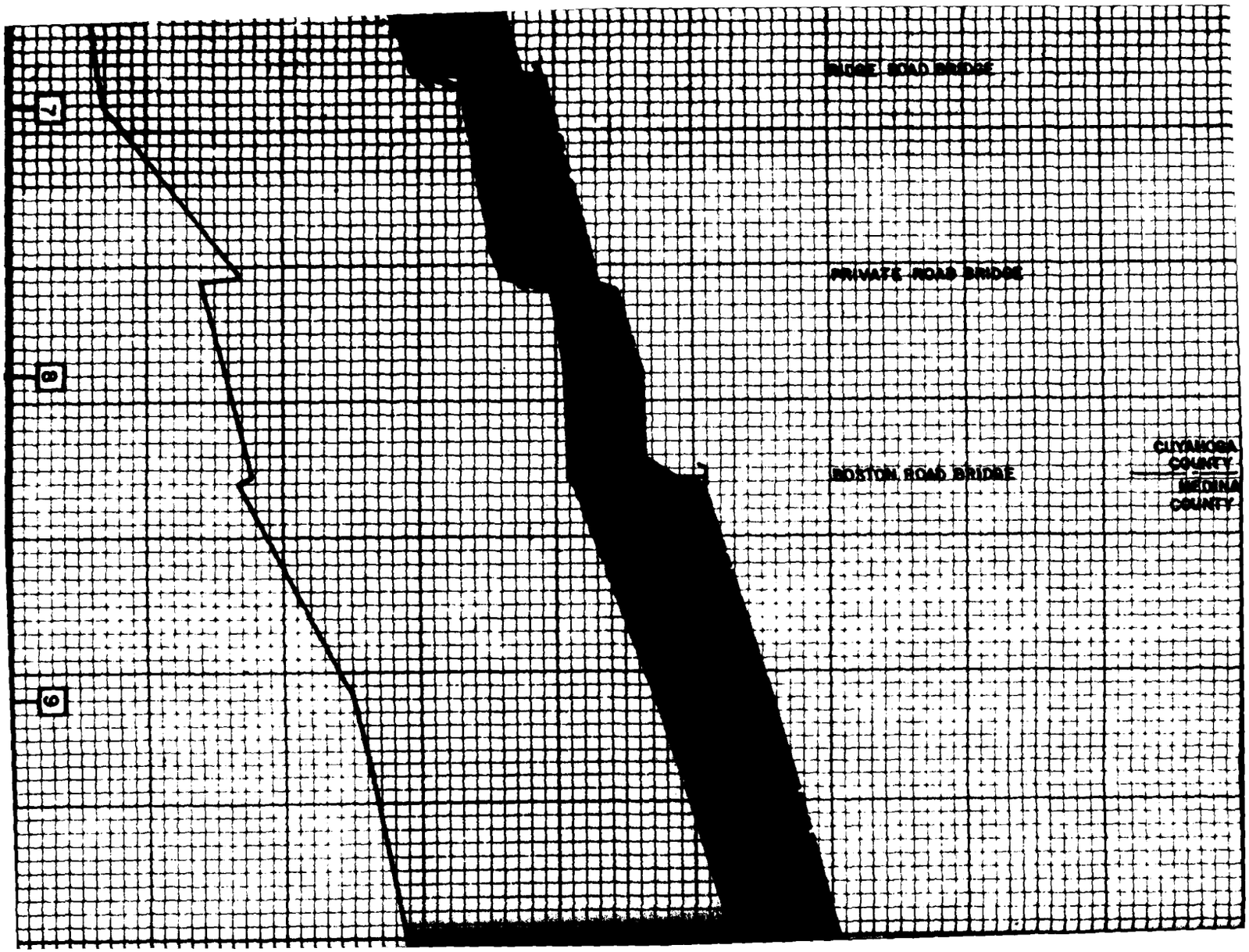
JUNE 1974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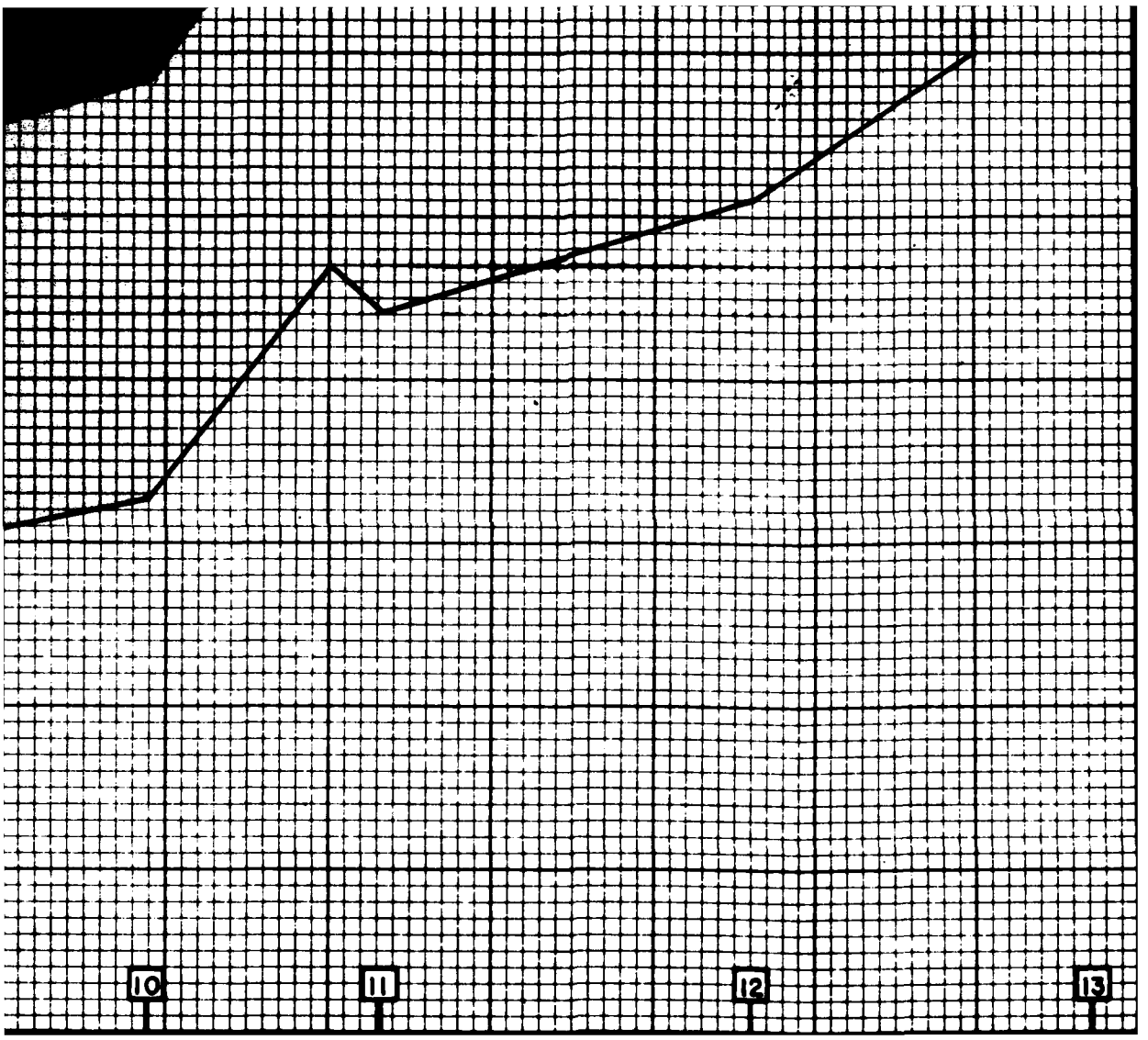
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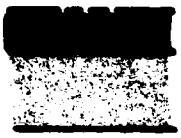

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

APPROXIMATE STREAM BED

APPROXIMATE BRIDGE FLOOR ELEVATION

APPROXIMATE LOW STEEL ELEVATION

LOCATION OF VALLEY CROSS SECTION

NOTES:

FLOOD PROFILES ARE BASED ON THE FOLLOWING:

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2. EXISTING STRUCTURES
3. EXISTING CONDITIONS OF DEVELOPMENT

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EAST BRANCH ROCKY RIVER
CITY OF NORTH ROYALTON & HINCKLEY TOWNSHIP
CUYAHOGA & MEDINA COUNTIES, OHIO

FLOOD PLAIN INFORMATION REPORT

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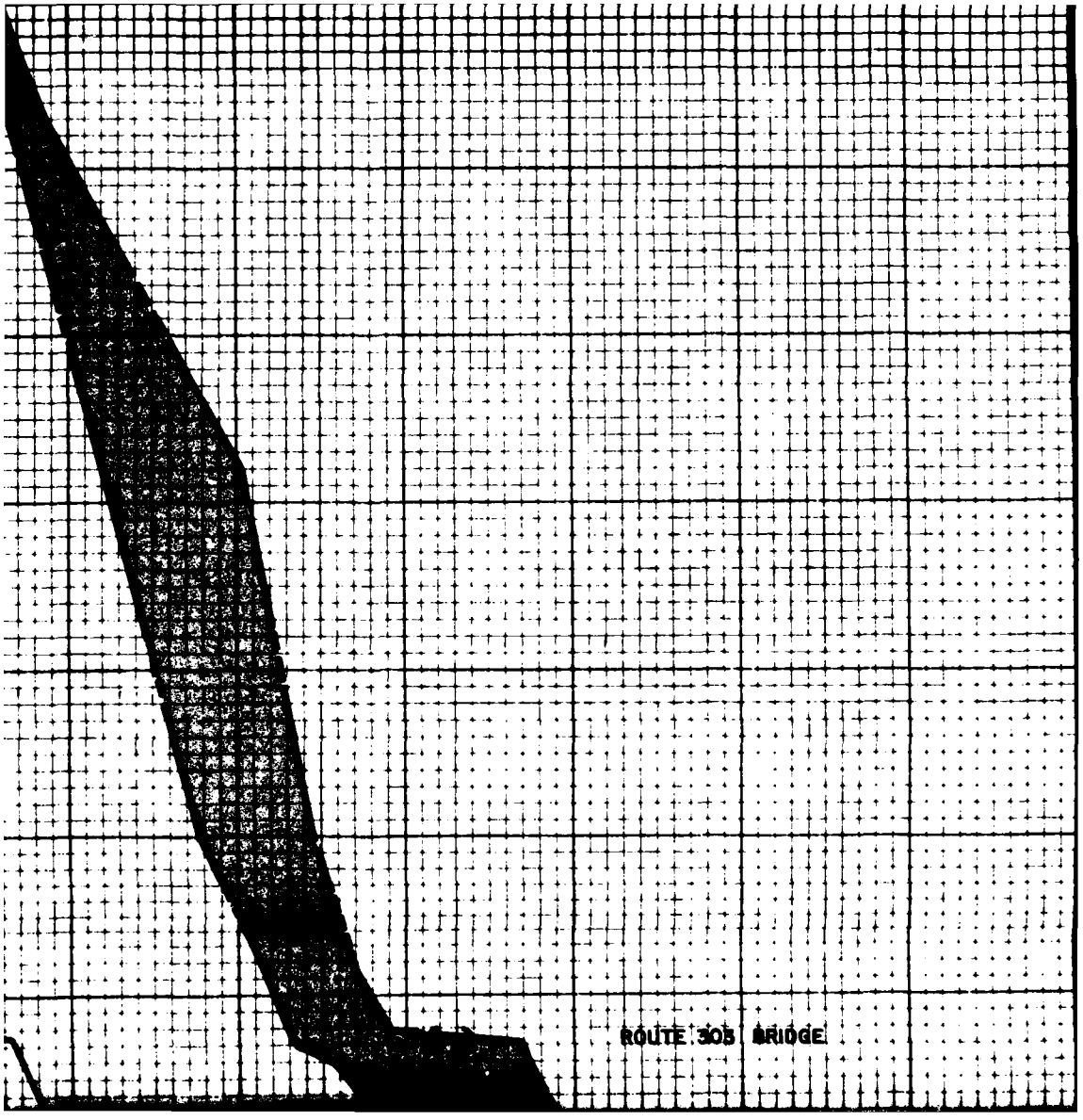
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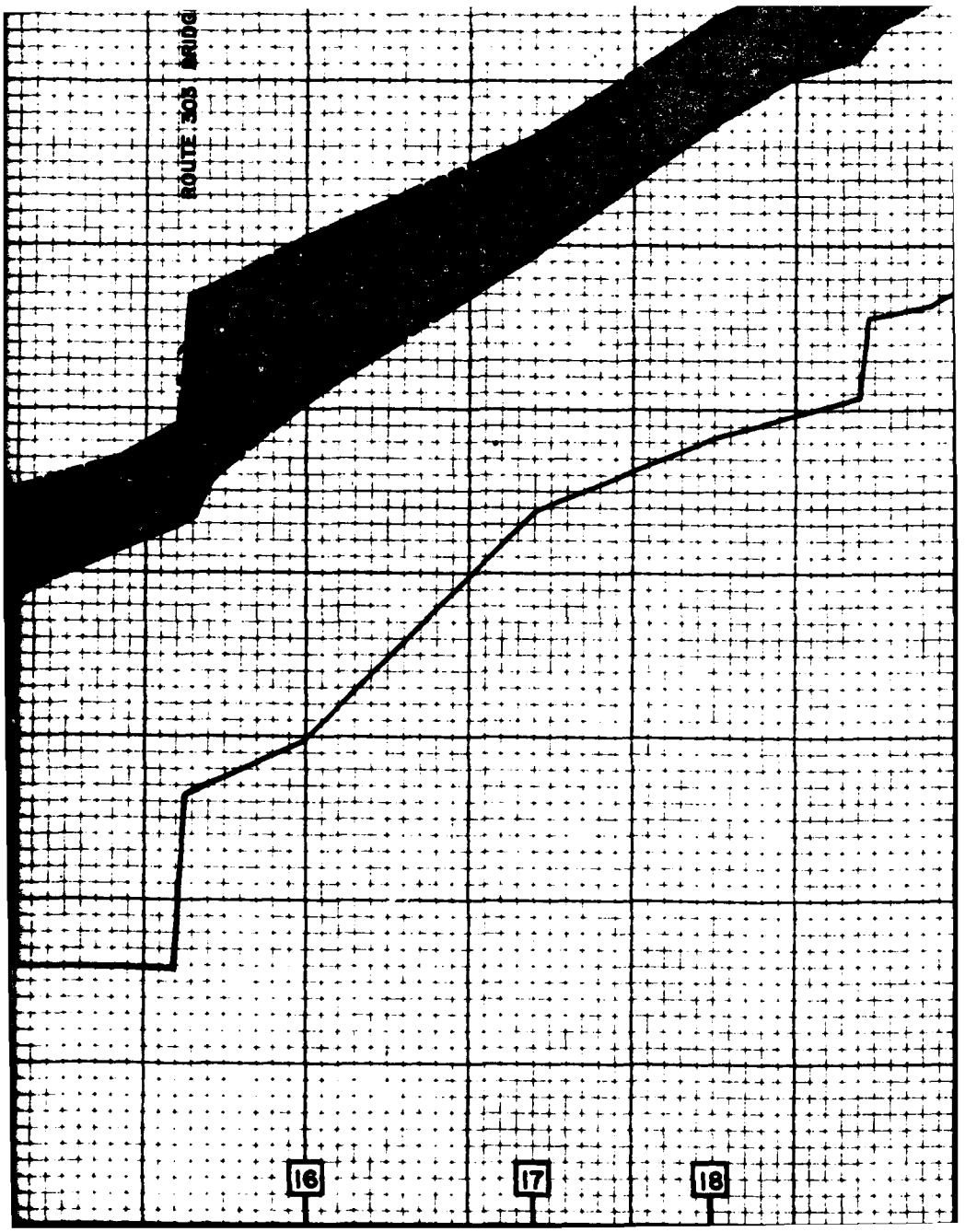
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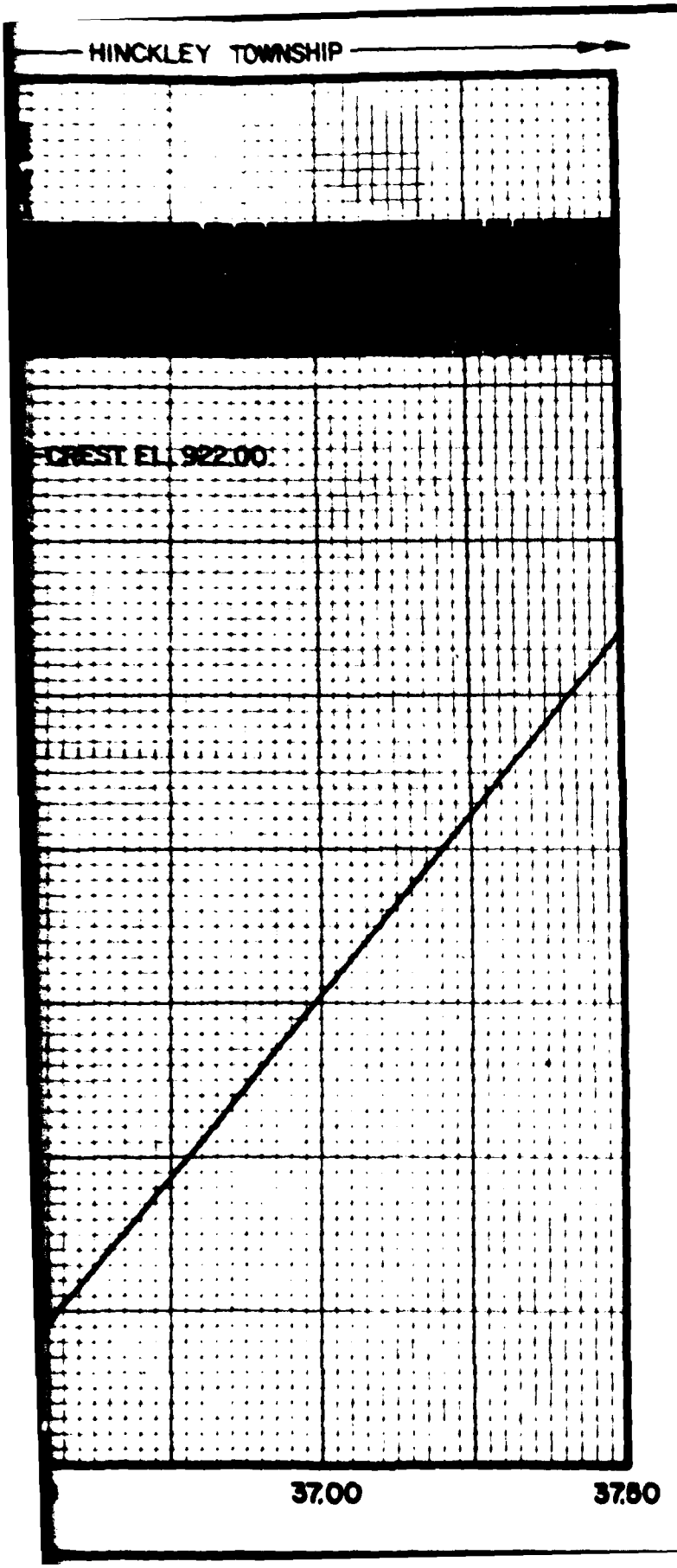

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LOCATION OF VALLEY CROSS SECTION

NOTES:

FLOOD PROFILES ARE BASED ON THE FOLLOWING:

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2. EXISTING STRUCTURES
3. EXISTING CONDITIONS OF DEVELOPMENT

LARGE SCALE FILLING WILL RAISE PROFILES UNLESS SUFFICIENT FLOODWAY IS PROVIDED.

EAST BRANCH ROCKY RIVER
CITY OF NORTH ROYALTON & HINCKLEY TOWNSHIP
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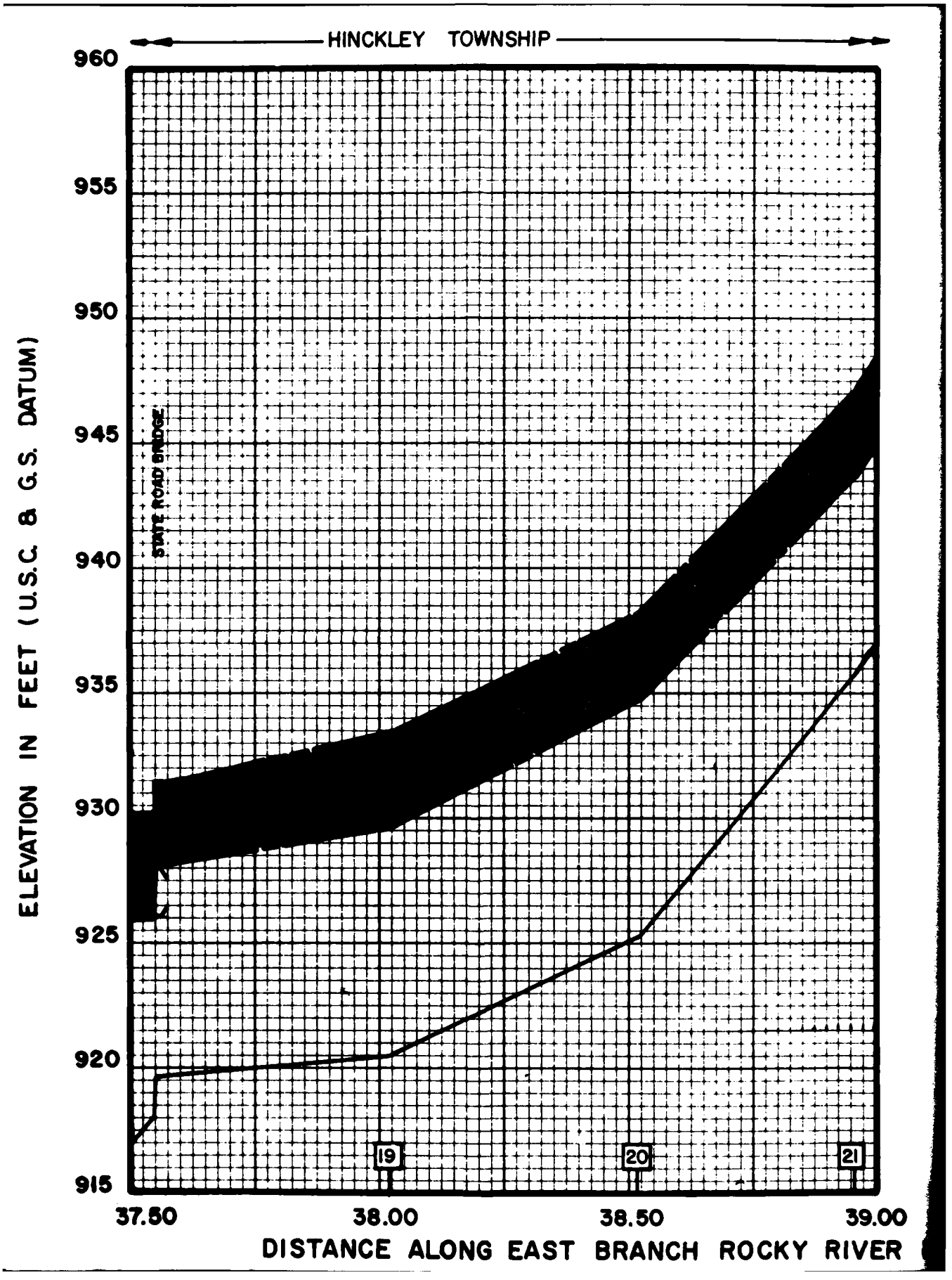
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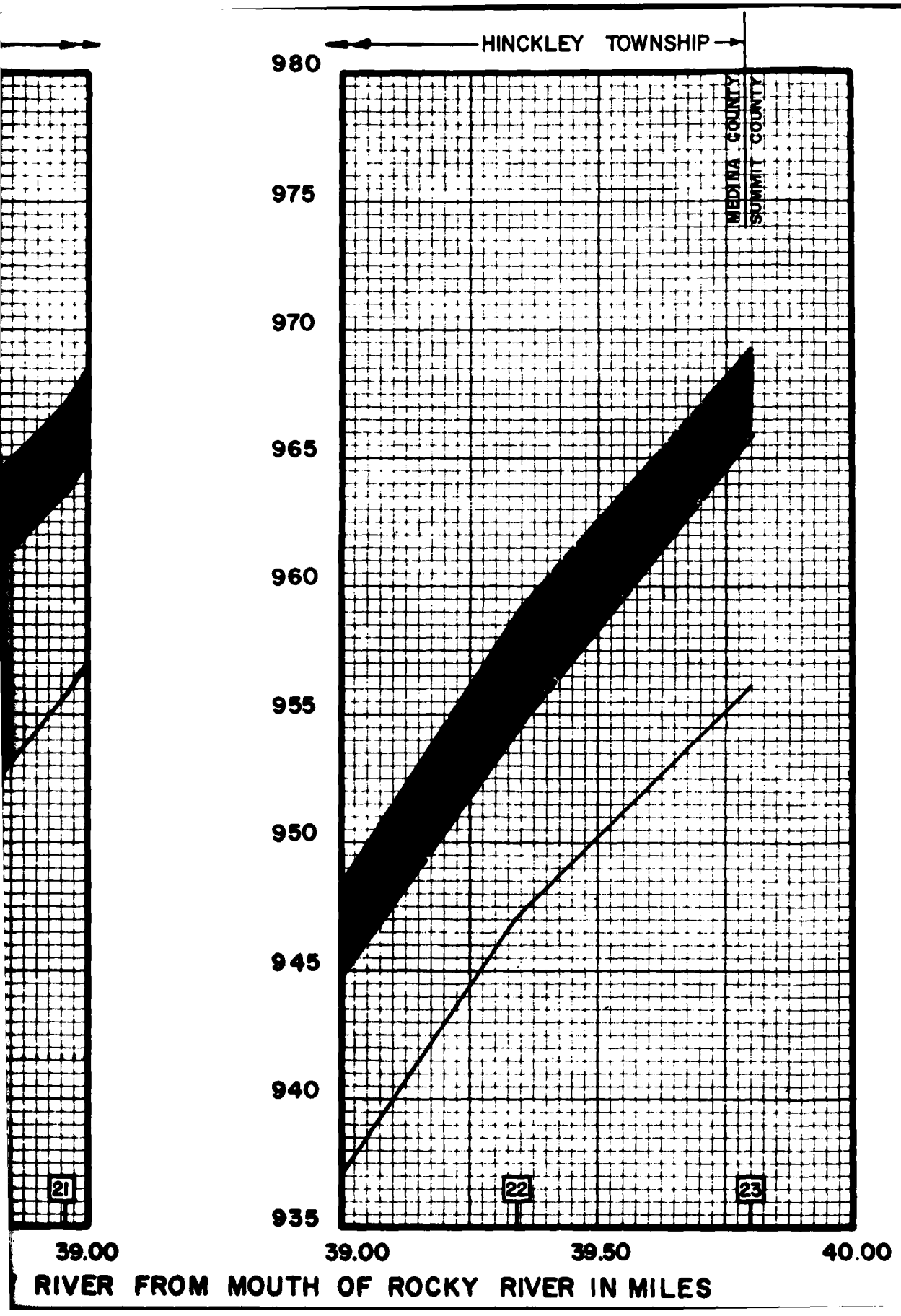
ELEVATION IN FEET (U.S.C. & G.S. DATUM)
STATE ROAD BRIDGE
19
20
21
37.50
38.00
38.50
39.00
DISTANCE ALONG EAST BRANCH ROCKY RIVER



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NOTE

FLOOD PROFILES A

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2. EXISTING ST

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LARGE SCALE FIL

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STANDARD PROJECT FLOOD

NTERMEDIATE REGIONAL FLOOD

APPROXIMATE STREAM BED

APPROXIMATE BRIDGE FLOOR ELEVATION

APPROXIMATE LOW STEEL ELEVATION

LOCATION OF VALLEY CROSS SECTION

OTES:

LES ARE BASED ON THE FOLLOWING:

G CHANNEL CONDITIONS

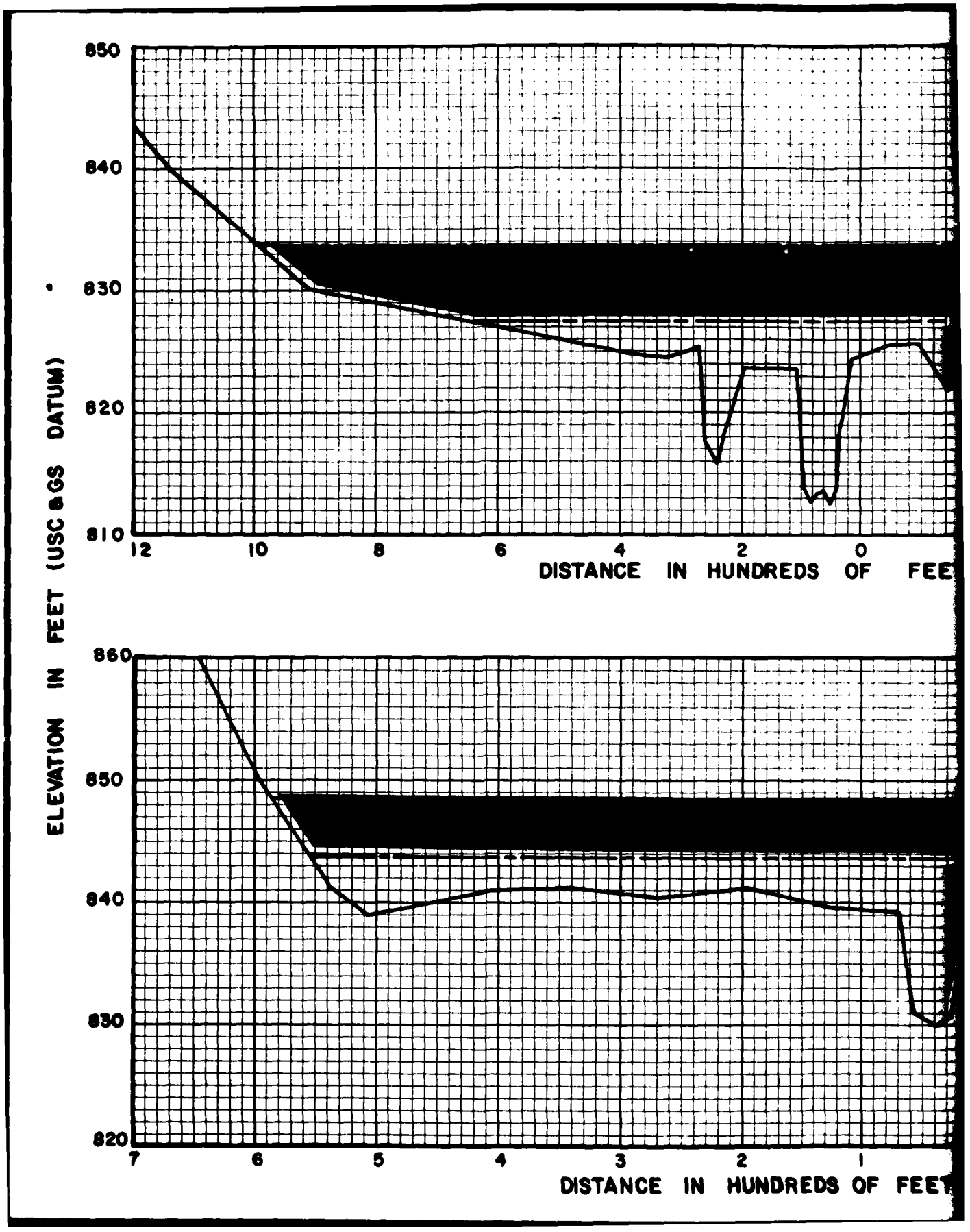
STRUCTURES

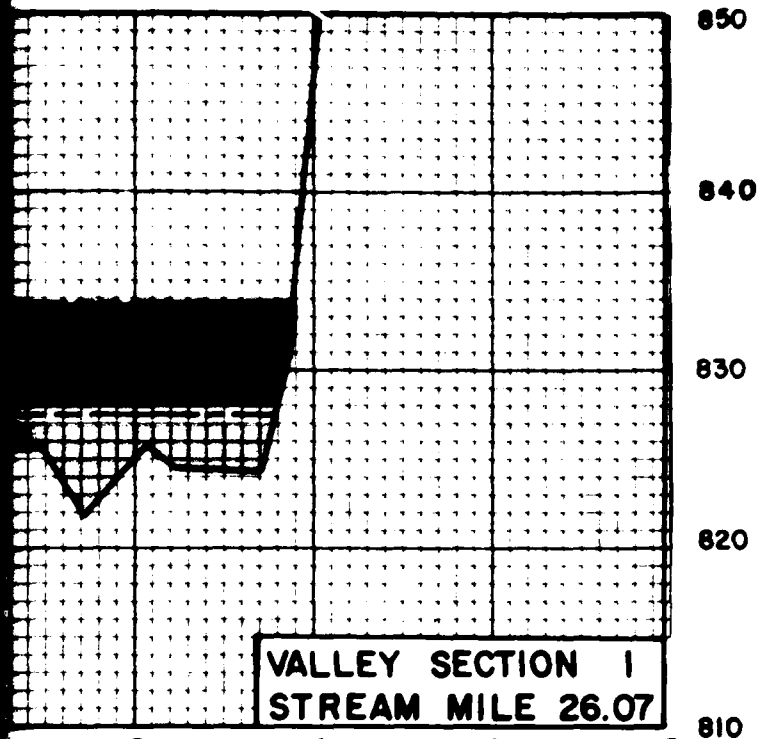
G CONDITIONS OF DEVELOPMENT

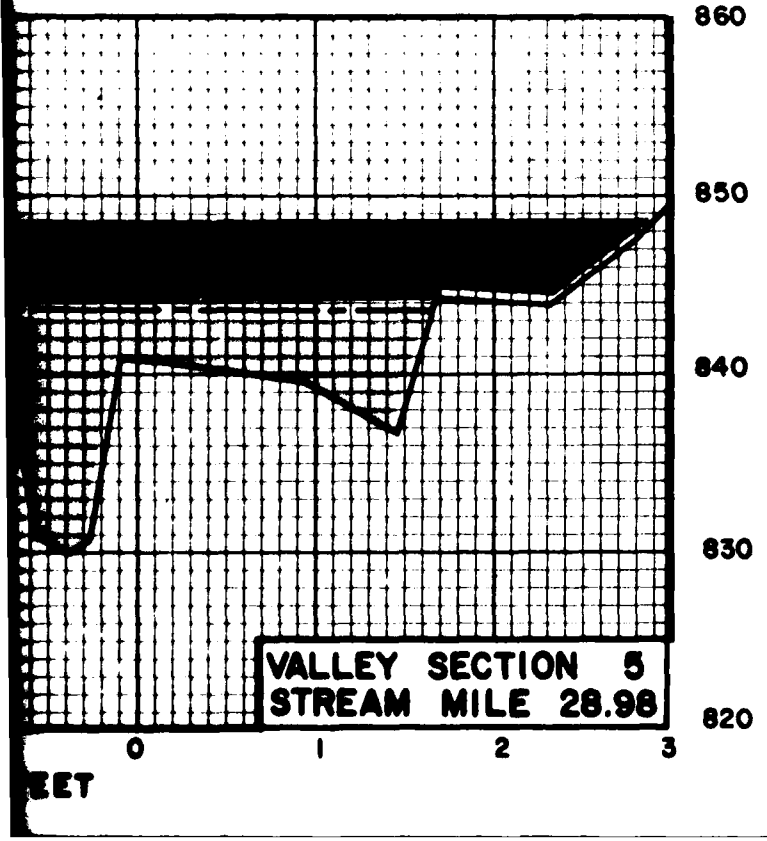
LE FILLING WILL RAISE PROFILES UNLESS FLOODWAY IS PROVIDED.

EAST BRANCH ROCKY RIVER
CITY OF NORTH ROYALTON &
HINCKLEY TOWNSHIP
CUYAHOGA & MEDINA COUNTIES, OHIO
FLOOD PLAIN INFORMATION REPORT
PROFILES
MILE 37.50 TO 39.80
U.S. ARMY ENGINEER DISTRICT BUFFALO
JUNE 1974

PLATE 9


ELEVATION IN FEET (USC&GS DATUM)
850
840
830
820
810
12
10
8
6
4
2
0
DISTANCE IN HUNDREDS OF FEE
860
850
840
830
820
7
6
5
4
3
2
1
DISTANCE IN HUNDREDS OF FEET





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MATE REGIONAL FLOOD

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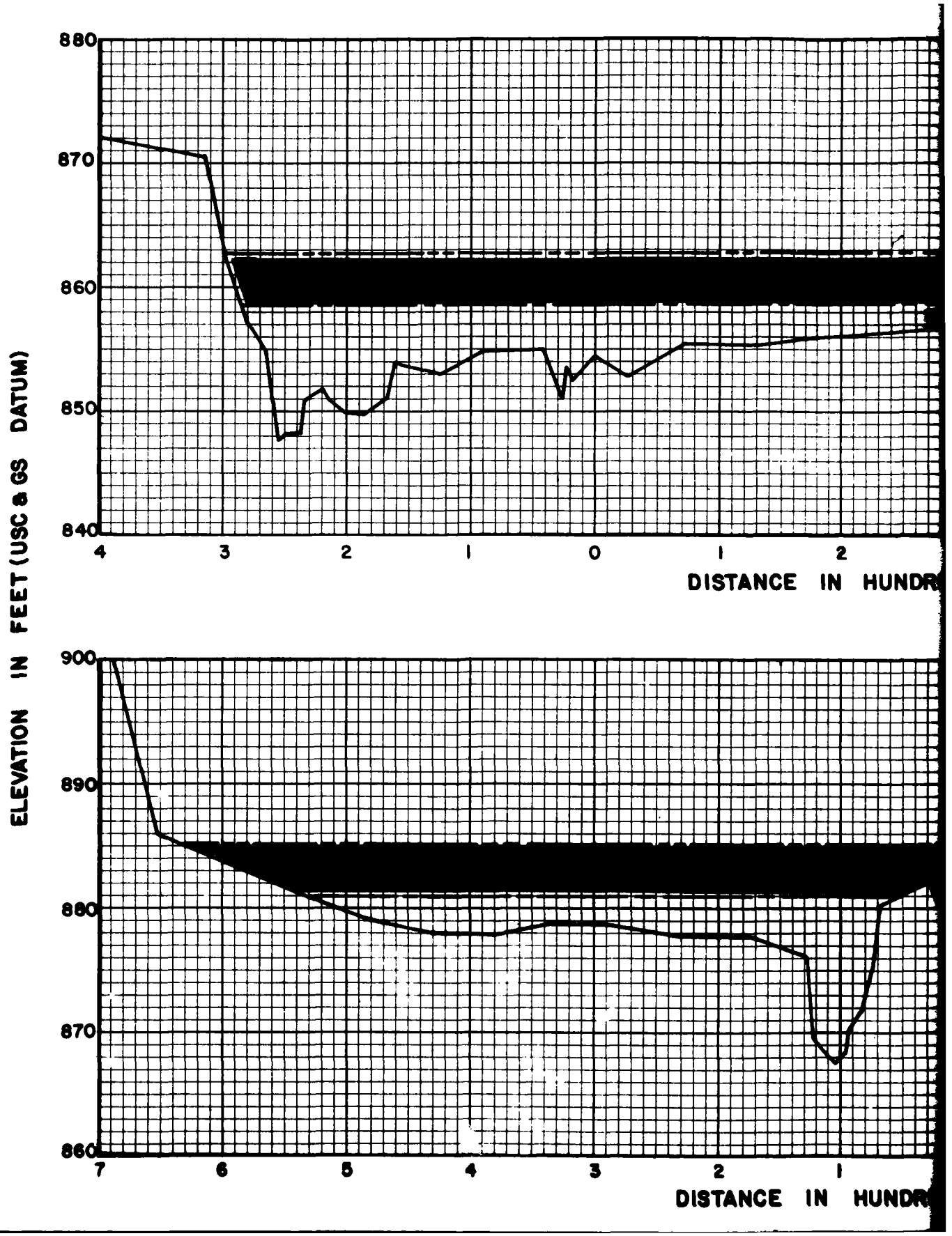
OTES

ECTIONS ARE BASED ON
URVEYS AND U.S.
VEY QUADRANGLE MAPS.

ECTIONS ARE LOOKING
ARE LOCATED ON

T BRANCH ROCKY RIVER
OF NORTH ROYALTON &
HINCKLEY TOWNSHIP
BA & MEDINA COUNTIES, OHIO
PLAIN INFORMATION REPORT
LEY CROSS SECTIONS
1 AND 5
Y ENGINEER DISTRICT BUFFALO
JUNE 1974

PLATE 10 3


880
870
860
850
840
4
3
2
1
0
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2
DISTANCE IN HUNDR
900
890
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860
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3
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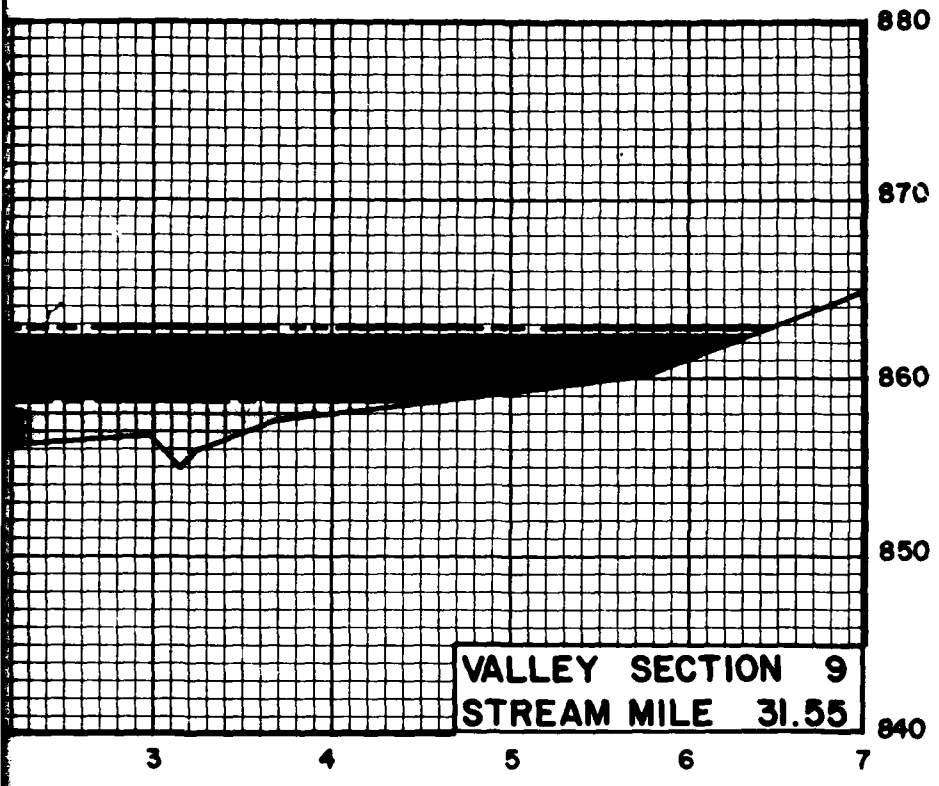
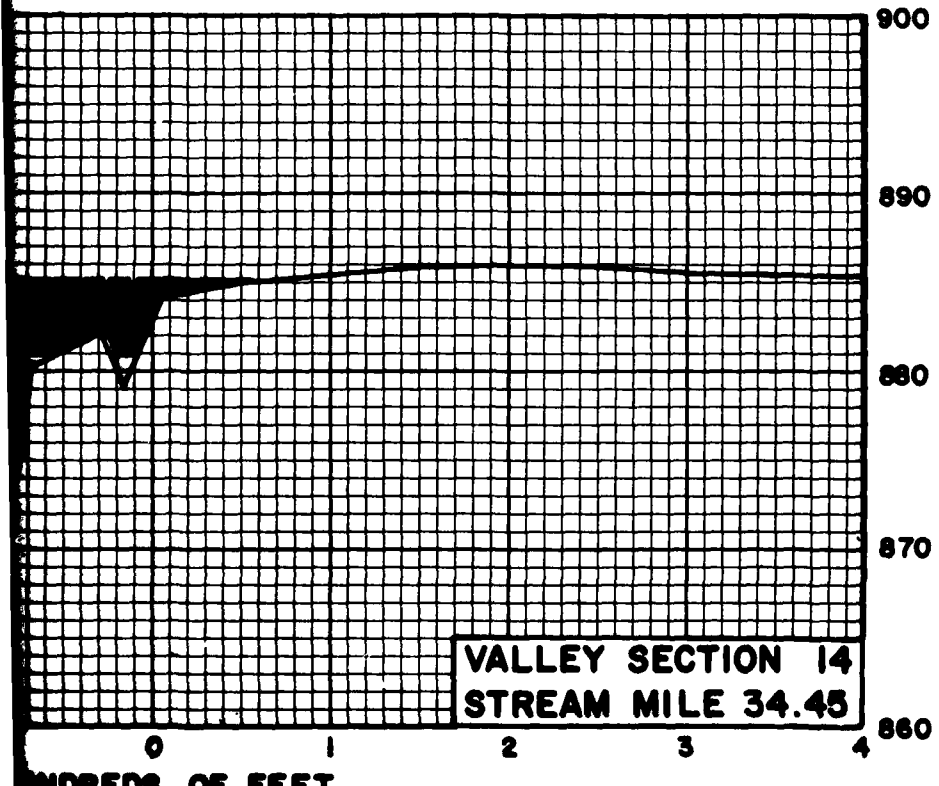
DISTANCE IN HUNDR
ELEVATION IN FEET (USC & GS DATUM)





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NOTES

SECTIONS ARE BASED ON
SURVEYS AND U.S.
VEY QUADRANGLE MAPS.

SECTIONS ARE LOOKING
D ARE LOCATED ON
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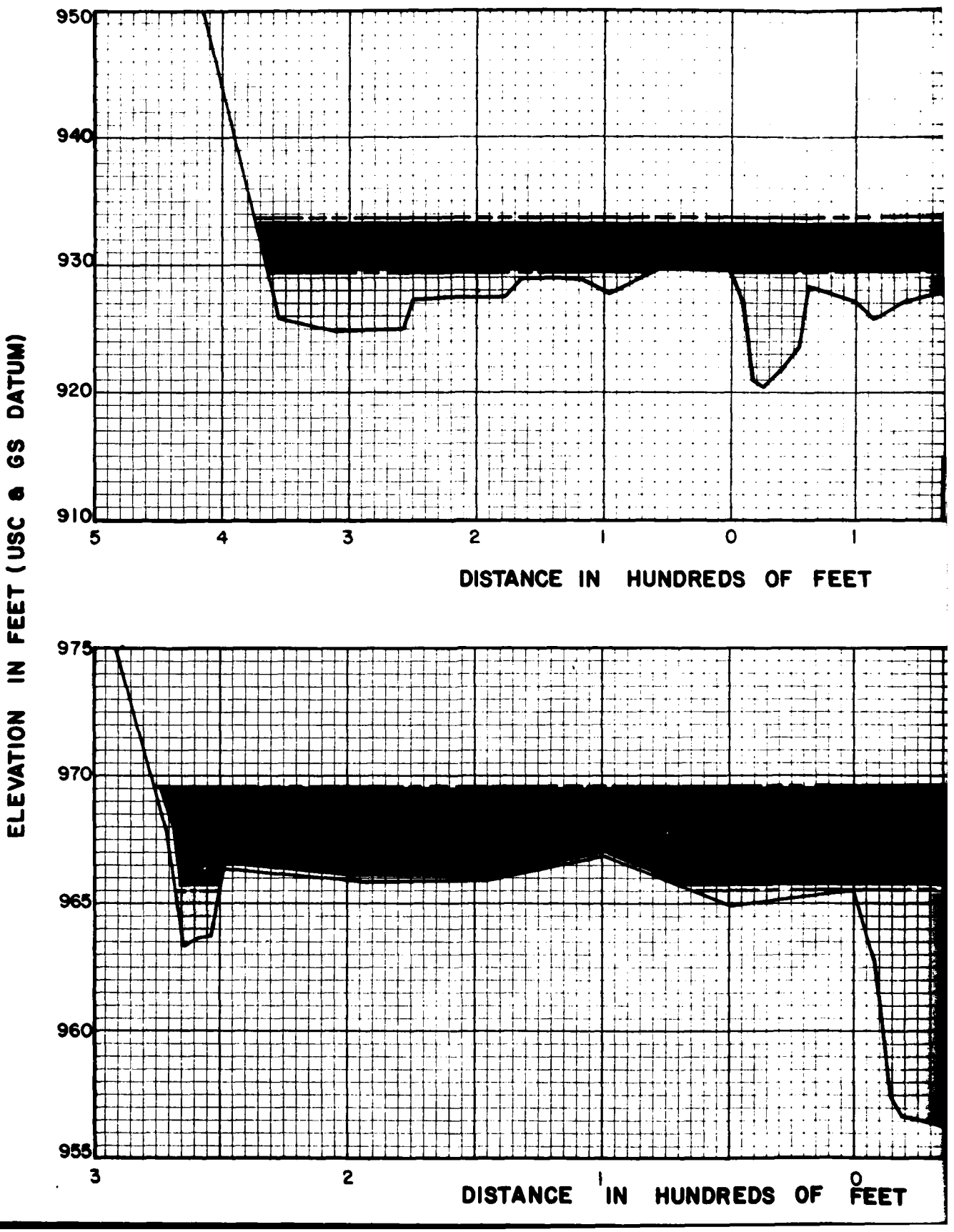
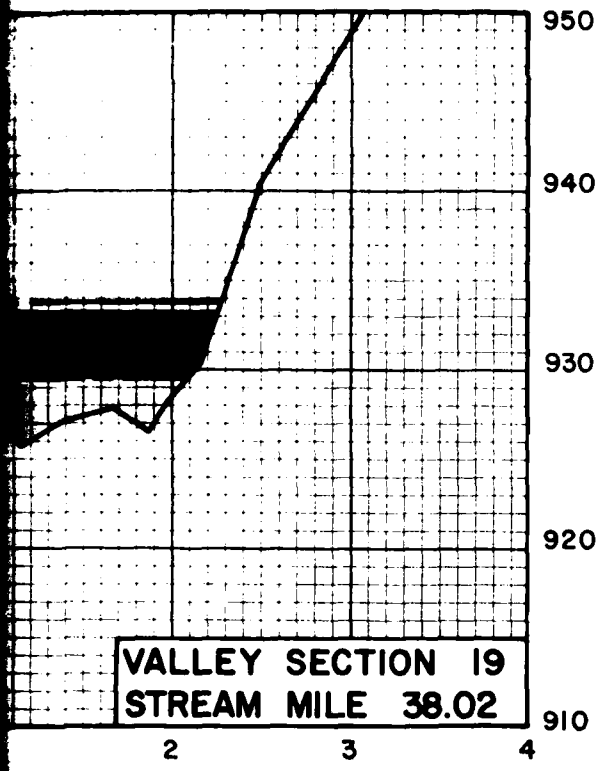
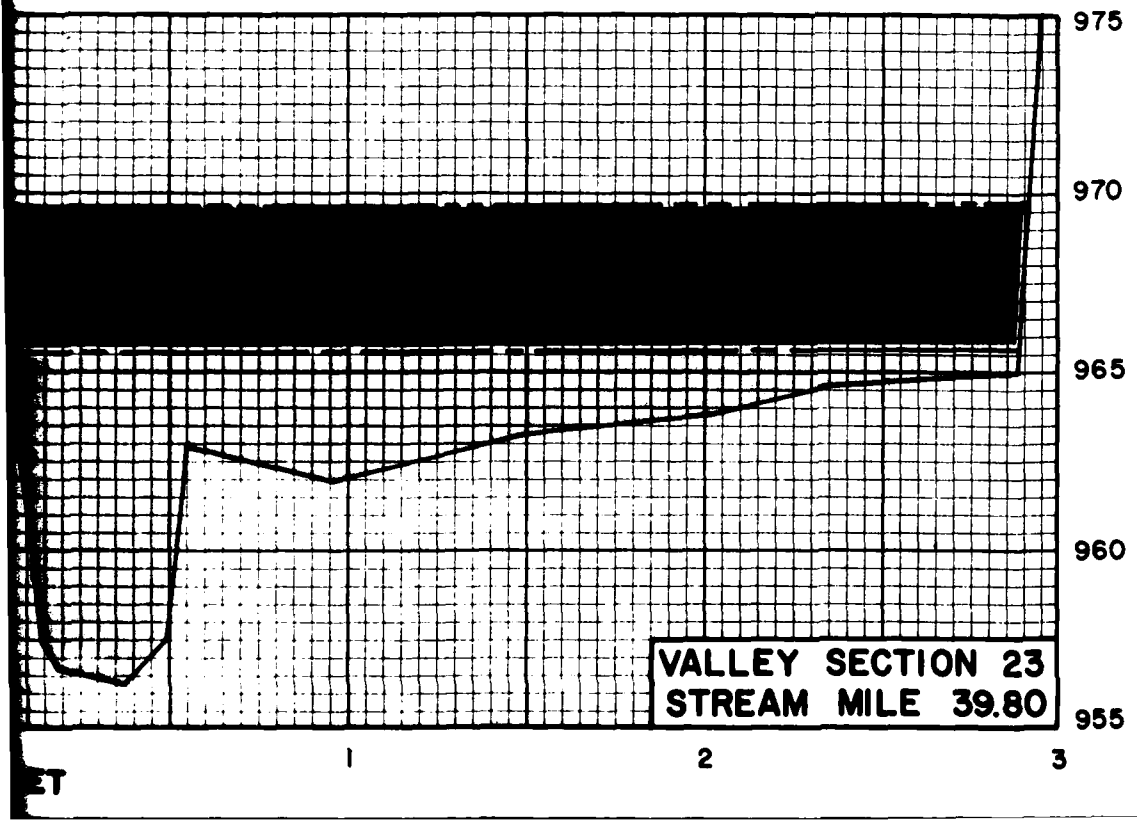
T BRANCH ROCKY RIVER
Y OF NORTH ROYALTON &
HINCKLEY TOWNSHIP
GA & MEDINA COUNTIES, OHIO
PLAIN INFORMATION REPORT
LEY CROSS SECTIONS
9 AND 14
Y ENGINEER DISTRICT BUFFALO
JUNE 1974

PLATE 11


950
940
930
920
910
5
4
3
2
1
0
1
DISTANCE IN HUNDREDS OF FEET
975
970
965
960
955
3
2
1
0
DISTANCE IN HUNDREDS OF FEET
ELEVATION IN FEET (USC & GS DATUM)





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NOTES

S SECTIONS ARE BASED ON
D SURVEYS AND U.S.
SURVEY QUADRANGLE MAPS.

S SECTIONS ARE LOOKING
AND ARE LOCATED ON

EAST BRANCH ROCKY RIVER
ITY OF NORTH ROYALTON &
HINCKLEY TOWNSHIP
AHOGA & MEDINA COUNTIES, OHIO
OD PLAIN INFORMATION REPORT
ALLEY CROSS SECTIONS
19 AND 23
ARMY ENGINEER DISTRICT BUFFALO
JUNE 1974

PLATE 12